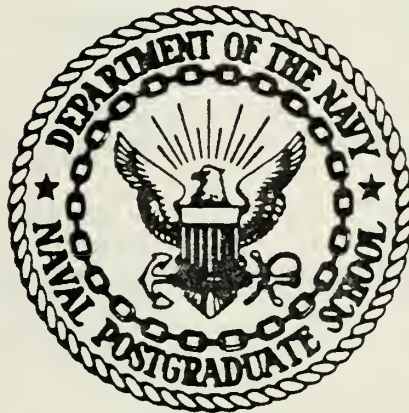


NAVAL POSTGRADUATE SCHOOL

Monterey, California



THESIS

THE STRUCTURE, CONDUCT AND PERFORMANCE
OF THE
UNITED STATES TELECOMMUNICATIONS INDUSTRY

by

Richard Walter Mayo
William Warren Wittmann

March 1977

Thesis Advisor:

C. A. Jones

Approved for public release; distribution unlimited.

T177955

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) The Structure, Conduct and Performance of the United States Telecommunications Industry		5. TYPE OF REPORT & PERIOD COVERED Master's Thesis; March 1977
7. AUTHOR(s) Richard Walter Mayo William Warren Wittmann		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS Naval Postgraduate School Monterey, California 93940		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS Naval Postgraduate School Monterey, California 93940		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) Naval Postgraduate School Monterey, California 93940		12. REPORT DATE March 1977
		13. NUMBER OF PAGES 227
		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number)		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This thesis effort is a study of the domestic telecommunications industry with specific emphasis upon the principal publicly regulated telephone and telegraph utilities, American Telephone & Telegraph and Western Union respectively. The principal elements of the study will concern market structure, market conduct and market performance of the telecommunications		

20. Abstract (Cont'd)

utilities. In particular, a significant amount of attention will be directed towards such subjects as vertical integration, antitrust policy, technology and innovation, and the FCC's current studies towards limited competition within the industry. Concluding work will focus on DOD's role as a consumer of telecommunication services and facilities and its potential influence with regard to changing or maintaining the status quo of the domestic telecommunications industry. An historical survey of the industry's development will precede the analysis.

Approved for public release; distribution unlimited.

The Structure, Conduct and Performance of the
United States Telecommunications Industry

by

Richard Walter Mayo
Lieutenant, United States Navy
A.B., Brown University, 1968

William Warren Wittmann
Lieutenant, United States Navy
B.A., University of Nebraska, 1970

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

from the
NAVAL POSTGRADUATE SCHOOL
March 1977

ABSTRACT

This thesis effort is a study of the domestic telecommunications industry with specific emphasis upon the principal publicly regulated telephone and telegraph utilities, American Telephone & Telegraph and Western Union respectively. The principal elements of the study will concern market structure, market conduct and market performance of the telecommunications utilities. In particular, a significant amount of attention will be directed towards such subjects as vertical integration, antitrust policy, technology and innovation, and the FCC's current studies towards limited competition within the industry. Concluding work will focus on DOD's role as a consumer of telecommunication services and facilities and its potential influence with regard to changing or maintaining the status quo of the domestic telecommunications industry. An historical survey of the industry's development will precede the analysis.

TABLE OF CONTENTS

I.	INTRODUCTION -----	9
A.	THESIS ORGANIZATION -----	10
B.	LITERATURE REVIEW -----	11
C.	EXPLANATORY NOTES/TERMS -----	14
1.	Intercommunications -----	14
2.	Natural Monopoly and the Regulated Sector -----	16
3.	Common Carriers -----	18
II.	HISTORY OF THE UNITED STATES TELECOMMUNICATIONS INDUSTRY -----	21
A.	1832 THROUGH 1894 -----	21
B.	1895 THROUGH 1922 -----	27
C.	1923 THROUGH 1945 -----	33
D.	1946 THROUGH 1956 -----	37
E.	1957 THROUGH 1971 -----	41
F.	1972 TO THE PRESENT -----	50
G.	CURRENT INDUSTRY MAKE-UP -----	53
III.	STRUCTURE OF THE UNITED STATES TELECOMMUNICATIONS INDUSTRY -----	54
A.	INTRODUCTION -----	54
B.	CONCENTRATION OF THE INDUSTRY -----	59
1.	Telephone Sector -----	61
C.	PRODUCT DIFFERENTIATION -----	74

D.	BARRIERS TO ENTRY -----	76
1.	Economies of Scale -----	77
2.	Patents -----	84
3.	Absolute Cost -----	85
4.	Product Differentiation -----	86
5.	Regulation -----	87
E.	THE OTHER SECTORS -----	89
1.	The Interconnect Sector -----	90
2.	Other Common Carriers -----	91
3.	Domestic Telegraph -----	95
4.	Public Land Mobile Radio Service -----	97
F.	SUMMARY -----	97
IV.	CONDUCT OF THE UNITED STATES TELECOMMUNICATIONS INDUSTRY -----	99
A.	INTRODUCTION -----	99
1.	Telecommunications Market Players -----	100
2.	Telecommunications Versus Teleprocessing -----	104
B.	TELECOMMUNICATIONS SERVICES/PRODUCT QUALITY AND MARKET COMPETITION -----	105
1.	Pre-"Above 890"/Carterfone/MCI -----	108
2.	Post-"Above 890"/Carterfone/MCI -----	116
a.	Private Line Services -----	118
b.	Terminal Equipment Services -----	125
3.	FCC Docket 20003 -----	127

4.	Thoughts On The Future of Market Competition -----	130
C.	PRICE DETERMINATION/RATEMAKING PRINCIPLES -----	131
1.	The Rate Base and the Rate of Return -----	132
2.	Pricing Philosophy -----	137
3.	FCC Docket 18128 -----	139
D.	GOVERNMENTAL REGULATION -----	142
E.	OVERVIEW -----	145
V.	PERFORMANCE OF THE UNITED STATES TELECOMMUNICATIONS INDUSTRY -----	147
A.	INTRODUCTION -----	147
B.	PRODUCT PERFORMANCE AND TECHNOLOGICAL PROGRESS -----	151
C.	SELLING COSTS -----	160
D.	TECHNICAL EFFICIENCY -----	163
E.	ALLOCATIVE EFFICIENCY -----	167
F.	FULL EMPLOYMENT AND INCOME DISTRIBUTION -----	173
VI.	THE DEPARTMENT OF DEFENSE AS A CONSUMER -----	176
A.	SERVICES/FACILITIES CONTRACTED -----	179
B.	CONDITIONS UNDER WHICH CONTRACTED -----	180
C.	ALTERNATIVE PURCHASING ENVIRONMENTS -----	182
VII.	FINAL THOUGHTS AND POLICY RECOMMENDATIONS ----	185
APPENDIX A:	RATE OF RETURN FORMULAE -----	196

FOOTNOTES	-----	202
BIBLIOGRAPHY	-----	216
INITIAL DISTRIBUTION LIST	-----	227

I. INTRODUCTION

The United States telecommunications industry is analyzed in this thesis in terms of its structure, conduct and performance. In fact, the industry is composed of one giant corporation, several other large companies, and numerous small companies which have a significant impact on the economy and the welfare of the United States. The telecommunications industry was selected by the authors because of its immense interest to them. As students in the Telecommunications Management Curriculum, this interest has been stimulated by courses in teleprocessing, real-time information systems and microeconomics. Furthermore, the Department of Defense (DOD) already leases a considerable amount of services and facilities from the industry and due to the economic climate prevalent in the DOD at present, the authors hypothesized that further leasing of services and facilities from the telecommunications common carriers rather than full-scale independent DOD development of identical services would grow to be the rule rather than the exception.

A. THESIS ORGANIZATION

Structure, conduct and performance are key elements in the economic analysis of an industry. After an historical survey of the development of the telecommunications industry, which is covered in Chapter Two, the authors will analyze the sub-elements which comprise the structure, conduct and performance of the United States telecommunications industry and discuss how these sub-elements interact. Chapter Three will discuss the structure sub-elements which, for the purposes of this study, consist of: concentration ratios of the firms in the industry, product differentiation, and barriers to entry. The conduct of the individual firm(s) within this structure is described in Chapter Four. Conduct sub-elements consist of: product quality, market competition, price determination and the influences on behavior of firms in the industry. Chapter Five discusses the performance of the industry. Sub-elements of performance addressed are: product performance/technological progress, technical efficiency, allocative efficiency, and full employment/income distribution. Chapter Six discusses DOD as a consumer of telecommunications services. Alternative methods for satisfying DOD demand are also discussed. Lastly, an overview of the study and final thoughts and policy recommendations are presented.

B. LITERATURE REVIEW

The initial research for this effort quickly demonstrated the importance of the three elements of industry analysis identified by Richard Caves in American Industry: Structure, Conduct, and Performance. Further aid in establishing the ground rules for an industry study were offered by Industrial Organization, second edition, by Joe S. Bain; The Structure of American Industry by Walter Adams; and The Economics of Industry by Roger Sherman.

The analysis of the United States telecommunications industry is compounded by the fact that it is heavily regulated by both the federal and state governments. Excellent texts which provided worthwhile background information but more importantly focused upon the important regulatory issues of the telecommunications industry were The Telecommunications Industry, by Manley R. Irwin; The Economics of Regulation: Principles and Institutions, Volumes I and II, by Alfred E. Kahn; The Structure and Performance of the U.S. Communications Industry, by Kurt Borchardt; and The Economics of Regulation, by Charles F. Phillips, Jr.

In addition to many more books, student theses, periodicals, and government reports, it would be appropriate to mention those publications which contain current information on the status and trends of the telecommunications industry

and which proved invaluable in precipitating leads and questions in addition to providing hard information. These include Telecommunications, DataComm User, Datamation, Administrative Management, Business Week, Barrons and The Wall Street Journal.

Concerning past studies of the United States telecommunications industry, the authors found that most studies were conducted by the Federal Communications Commission (FCC), most often in relation to justifying or rejecting new tariffs proposed by the common carriers. FCC "Docket Numbers" thus proved to be our most valuable asset in reviewing previous work in this area, other than for the texts, mentioned previously, by Irwin and Borchardt.

One of the first efforts of the chapter on structure was the categorization of companies in the telecommunications industry by standard industrial classification (SIC) codes. Where indicated in the chapters on structure, conduct and performance, assumptions are stated which served to facilitate the analysis of the industry. Sources of information regarding SIC's was obtained from: The Standard Industrial Classification Manual; Standard and Poor's Register of Corporations, Directors and Executives; Directory of Companies Filing Annual Reports with the Securities and Exchange Commission; U.S. Independent Telephone Association,

Independent Telephone Statistics, Volume 1, 1976; Dun and Bradstreet Million and Middle Market Directories, 1976; Investors Management Sciences, Inc. COMPUSTAT tape; Moody's Investor's Service; Fortune's The Fifty Largest Utilities, July 1976; and Federal Communications Commission, Statistics of Communications Common Carriers, 1974.

In addition to the above references, many other articles, hearings, books and reports were utilized in the preparation of this thesis. Oral conversations were also elicited from people at various agencies and organizations with regard to the development of the study. Among those agencies and organizations contacted were:

1. Bureau of the Census
2. Federal Communications Commission (FCC)
3. Office of Telecommunications Policy (OTP)
4. U.S. Senate Subcommittee on Communications
5. U.S. House of Representatives Subcommittee on Communications
6. Director, Telecommunications Command and Control Systems (DTACCS) in Office of Secretary of Defense (OSD)
7. Defense Communications Agency (DCA)
8. U.S. Navy Office of Legislative Affairs

9. Ad Hoc Committee for Competition in Telecommunications (ACCT)
10. American Telephone & Telegraph Company (AT&T)
11. General Telephone & Electronics Corporation (GT&E)
12. Western Union Telegraph Company
13. U.S. Independent Telephone Association (USITA)

C. EXPLANATORY NOTES/TERMS

Several terms and phrases will be used rather frequently in the course of this study and the authors feel it is important to inform the reader of the interpretations and limitations placed on these terms and phrases by the authors.

1. Intercommunications

The first and most important distinction to be made concerns the scope of this communications study: the definition of telecommunications. The authors' intent is to examine the "intercommunications" aspect of the telecommunications industry as opposed to the "mass communications" area.¹ Intercommunications deals with point-to-point communications or the ability of individuals or entities to communicate directly with one another either in a uni-directional or bi-directional manner. Characteristics of intercommunications include the ability of the originator to furnish and control the content of messages transmitted and the ability to make

possible individual selections of connections through switching devices. Mass communications on the other hand pertains to broadcasting and the dissemination of information from a central node to peripheral stations. Unlike intercommunications, mass communications is solely uni-directional and does not employ switching devices from the emanating node to the listener. Within the classification of intercommunications, we should distinguish between "public" services (i.e., AT&T's public switched telephone system or the public message service of Western Union) and "private line services," peculiarly suited to private business or governmental organizations.² To distinguish the two, in private line services (PLS) the subscriber has a direct line between stations in different cities; calls using the private line, therefore, do not require switching at either the local exchange or toll trunk level and as such may be referred to as non-switched service in contrast to ordinary local or long distance calls which require switching through exchanges. PLS is inherently a better communications media than the public switched networks for voice, record and especially data transmission because of less line noise and greater available bandwidth due to the absence of "signaling" frequencies. However its cost is greater.

2. Natural Monopoly and the Regulated Sector

The concepts of "natural monopoly" and government regulation are indeed complex and no more than a cursory overview can be attempted in explanation. Advocates exist on both sides of the question of competition versus monopoly ranging from those who cite technological imperatives as the need for granting private monopolies all the way to the other end of the spectrum to those like Walter Adams who categorize "natural monopolies" as an "intellectual device that enables one to be simultaneously against monopoly in general and for monopoly in particular."³ Throughout the literature in the field of telecommunications the reader is confronted with "natural monopoly" frequently and in many different contexts (historical, economic, requirements for system integrity, etc.) so as to suit the argument(s) of the advocate. Whatever the correct answer to that question is, the fact is that the domestic telecommunications industry exists today as a regulated public utility, a representative part of all public utilities which the competitive market model does not describe or purport to describe.⁴ Indeed,

...the primary guarantor of acceptable performance is conceived to be (whatever it is in truth) not competition or self restraint but direct governmental prescription of major aspects of their structure and performance.⁵

Principally because of large economies of scale, and the fact that public utilities comprise a general class of business which is designated by our laws and courts as "business affected with a public interest," we have witnessed the evolution of what is called the "regulated sector." It can be distinguished from the other sectors of the economy by four elements: the government controls market entry; the government fixes the prices of the industry; the government prescribes conditions of quality and service; and the government imposes an obligation upon the utility to serve all customers on an equitable basis.⁶

As mentioned above, the governmental regulation of business has as one of its principal sources the constitutional grants of, and subsequent legal interpretations placed upon, governmental authority. In fact, the Constitution gives to Congress the power to regulate interstate and foreign commerce and it is this clause which forms the basis for much governmental authority today. In Gibbons v. Ogden, the Supreme Court said interstate commerce means transportation and communication across state boundaries and internal state commerce which has an effect in other states or which concerns more than one state. This case, which first interpreted the Commerce Clause, is cited as the present-day authority of the government to regulate such

interstate activities as the telephone and telegraph utilities.⁷

The regulated sector of our economy is therefore an accepted fact, whether the mandate be constitutional, legal, or economic. In this context the structure and conduct of the telecommunications industry will be analyzed.

3. Common Carriers

"Common carrier" will be a term used frequently throughout the study. A quick researching of the phrase would show that in the course of development of the common law of the English-speaking peoples, the concept of public utility first emerged in connection with transportation and the instruments necessary for transportation. The term common carrier was applied to all those engaged in serving the public with transportation and the associated services.

As common carriers, they held themselves out to serve the public on demand and were allowed to charge no more than a reasonable price. By analogy, the concept of the regulated common carrier was extended to modern public utilities as technology advanced, since they, too, are transporters, although of gas, electricity, water, telephone messages, and urban passengers.⁸

Today the term common carrier is applied to those telephone and telegraph companies operating over the public switched network. These companies are called the "established common carriers" and consist of the giant AT&T and

its operating companies, Western Union and the over sixteen hundred independent telephone companies which are organized as the U.S. Independent Telephone Association (USITA). In addition to the established common carriers, several other categories of common carriers exist: specialized common carriers (SCC's) dealing primarily in private line microwave services and limited public offerings; value added networks/carriers (VAN's) which impose an "added value" such as data processing and packet switching on lines leased from established common carriers for resale to private users; domestic satellite carriers (DSC's) which operate PLS; and public land mobile radio common carriers (RCC's) which offer such services as mobile radio/telephone service, paging services, and rural radio services. Discussion of RCC's will be minimal in this thesis because of their small size in relation to the total domestic telecommunications industry and the fact that the FCC's recent administrative rulings dealing with competition within the telecommunications industry principally concern the established common carriers, the SCC's, the VAN's, and the DSC's, all of which will be discussed at length in the following chapters on structure, conduct, and performance. SCC's, VAN's and DSC's are frequently referred to as other common carriers (OCC's) in the

literature available and will be referred to herein in a similar manner whenever convenient.

II. HISTORY OF THE UNITED STATES TELECOMMUNICATIONS INDUSTRY

The following survey of the development of the United States telecommunications industry is divided loosely into six separate chronological periods. They are generally periods of time when related sets of events occurred but should not necessarily be given appellations such as the "initial development stage," the "consolidation stage," the "communications satellite age," and so on. In the course of the historical survey, primary focus will be on the development of the American Telephone & Telegraph Company, the Western Union Telegraph Company, and lastly the independent telephone companies (ITC's) as a general group rather than by specific companies. This approach was taken because admittedly the dominant firms in the field historically have been AT&T and Western Union. Note how the telegraph and then telephone industries grew, sometimes in concert, most often separately.

A. 1832 - 1894

In 1832 Samuel F. B. Morse, a professional artist and instructor in art at New York University, began experimentation on an electrical communication system. Three years

later in 1835 he demonstrated that such a system was feasible after showing that signals could be transmitted by wire at what were then, incredible speeds. Morse was unable to convince private interests to enter into the new field of telegraphy however and telegraphy marked time until 1843 when Congress passed the Telegraph Act and appropriated \$30,000 to connect Washington and Baltimore by a commercial telegraph wire. The first message was sent by Morse in 1844 with the prophetic words, "What hath God wrought?" The line was operated by the Post Office until 1847 when Congress refused to renew the appropriation due to the line's unprofitability.

Thereafter the telegraph was developed by private ownership. Morse and his associates raised money to extend the line to Philadelphia and New York and the telegraph soon found wide use in the transmission of news and the dispatching of trains. Indeed a major stimulus to the growth of the industry was the rise of the Associated Press and its use of the telegraph to distribute news releases.⁹ Small companies, numbering about fifty by 1851, soon began operating in other parts of the country. A process of consolidation began the same year and many of these small telegraph companies were merged into a large new company which by 1856 had become known as the Western Union Telegraph Company.

Five years later the first transcontinental telegraph line had been built, primarily along the railroad rights-of-way, attributable, as mentioned previously, to the fact that railroads were one of telegraph's initial subscribers.

Two significant events occurred in 1866. The first concerned the formal entry of government into the domestic telegraph business. Passage of the Post Roads Act authorized the Postmaster General to fix rates annually for government telegrams, in addition to giving the telegraph companies construction rights over the public domain, post roads, and navigable streams and waters. Secondly, Western Union acquired two significant competitors - the American Telegraph Company and the United States Telegraph Company. Western Union then dominated the infant industry until 1881 when the Postal Telegraph Company entered the telegraph business. Purchased as a subsidiary by the Commercial Cable Company in 1886, Postal bought out independents where it could and by the end of the century was in a position to compete favorably with Western Union.¹⁰

A further advancement of the regulatory arm into the emerging telegraph industry occurred in 1887 when the Interstate Commerce Commission (ICC) received Congressional authority to require interconnection among telegraph companies.

The telephone industry was undergoing a separate path of development from the telegraph industry during the latter quarter of the nineteenth century after the invention of the telephone by Alexander Graham Bell. The successful transmission in 1876 by wire of a complete sentence of spoken words heralded the introduction of a piece of equipment which would change forever the traditional modes of communication. "Yet, even after the first successful experiment in 1876, many doubted that the telephone had future significance."¹¹ As an example, the Bell patents, filed in 1876 and 1877, were first offered to the Western Union Telegraph Company for \$100,000.

For some reason, the telegraph company rejected the offer, but then later acquired the rival patents of Elisha Grey, Thomas A. Edison, and Amos Dolbear. A patent fight proved inevitable. A Supreme Court decision (four to three) awarded the basic patent right of the telephone instrument to the Bell interests in 1876. In subsequent negotiations, Western Union acknowledged the validity of the Bell patent, withdrew from the telephone field, licensed Bell its own Grey patents, agreed not to enter the telephone industry, and promised to pay 20 per cent of the cost of Bell's new patents developed or acquired by the Bell interests. In turn, Bell agreed to stay out of the telegraph field and to reimburse Western Union of all royalties on Bell's patents.¹²

Given the advantage of hindsight, a more fateful decision is unimaginable. Bell and his associates constructed the first telephone line in 1877 from Boston to the suburb of Somerville, Massachusetts. The following year, the association

of Bell business interests was incorporated in Massachusetts as the Bell Telephone Company. In 1879, it was incorporated as the National Bell Telephone Company and in 1880 reorganized into the American Bell Telephone Company. Throughout this nascent period, American Bell licensed companies and individuals to operate and leased equipments to them, taking in return a stock interest. This position was further strengthened by additional purchases of stock and consolidations and mergers. In 1881, American Bell acquired a substantial interest in the Western Electric Manufacturing Company of Chicago and changed its name to the Western Electric Company. Thus by this date, "a program that envisaged the co-ordination of all phases of the telephone industry was formulated: the supply of local exchange service, the development of long-distance service, and the organization of manufacturing affiliates to supply the necessary equipment were all developed under the control of the parent company."¹³ In 1885 the American Telephone & Telegraph Company (AT&T) was incorporated as a wholly owned subsidiary of American Bell. (The Supreme Court ruling of 1876 had not denied the Bell interests entry into the private-line telegraph service.) AT&T's primary function was to serve as the "long lines" division of American Bell, by connecting the local exchanges of the parent company. Thus

by acquiring controlling interests in local exchanges, by establishing the necessary long lines interconnections, and by acquiring Western Electric with its concomitant ability to furnish the equipment needs for the telephone system, the American Bell Telephone Company was preparing itself for 1893 and 1894 when the original Bell patents would expire.

ITC's began to materialize almost immediately after the issuance of the first Bell patents in 1876 and 1877. American Bell instituted over 600 patent infringement suits in the following years, up until 1893 when the patents began to expire. Many of these companies went out of business upon being sued, but the Supreme Court rendered a decision in 1888 involving all the sued independent companies which were still solvent, upholding the original Bell patents in their entirety. Therefore the growth of ITC's dates principally from 1894 when the patents expired.

Two things to note about the period 1832-1894 are (1) the separate development of the telegraph industry and the telephone industry as represented by the decision reached by Western Union and National Bell in 1879 to "leave" each other alone (later influences would almost certainly change this arrangement but for this period the two growing industries were essentially unto themselves), and (2) the

growing regulation of the industries by the government: witness the Post Roads Act; the authority of the ICC over telegraphy interconnection; the Supreme Court rulings concerning the Bell patents; and the specter of the Sherman Act. The latter element potentially represented the biggest regulatory effort made by the government. Passed by Congress in 1890, the act sought to deal with the existence of trusts or monopolistic combines and the political and economic power they exercised.

B. 1895 - 1922

The expiration of the original Bell patents had been skillfully anticipated. Theodore N. Vail, the President of American Bell, stood by to reap the rewards of his preparation for the flurry of new telephone companies organized by independents. As mentioned earlier, the country's long distance lines, operated by AT&T, were under control of the American Bell Company; telephone equipment manufacturing capacity was principally under American Bell through its Western Electric subsidiary; and licensing agreements had placed many operating companies under control of American Bell.

Most of the efforts by independent companies to penetrate the market were in the West, in areas not directly

competitive with American Bell. Those efforts which were made to penetrate Bell-dominated areas failed generally due to unprofitable rate provisions included in charter provisions and the lack of capital necessary for expansion and improvement.¹⁴

Overall, however, the period 1900-1907 represented the time of greatest growth among independent phone companies, especially in the rural areas.

By 1902, out of 1,051 incorporated cities in the United States with a population of more than 4,000, 1,002 were provided with telephone facilities. Independent telephone companies had exclusive service in 137 of these cities, the Bell interests served 414 cities, and the remaining 451 cities were served by both independents and Bell interests. By 1907, the Bell System owned 3.1 million stations, while independent companies owned 3 million.¹⁵

Controlling almost half of the market share represented the high water mark for the independents, but the hold was precarious at best. American Bell controlled newer patents, threatened and/or instigated patent infringement suits, refused to sell independents telephone equipment, exerted pressure on the financial community to dry up the supply of capital to the independents and also refused to interconnect its long distance facilities. Indeed, as several experts in the field such as Manley R. Irwin and Charles F. Phillips, Jr., have noted, the competitive aspects of this period are indeed striking as opposed to the market structure and conduct of later years.

It should be noted that rarely, if ever, have charges brought against the Bell System for such alleged misdeeds been upheld in court. Also there is absolutely nothing wrong with controlling patents or with launching patent-infringement suits. Nor is it illegal to refuse to buy from or sell to certain companies which are competitors. The critic seems to forget that 'natural monopoly' was not an accepted concept at that time, and that competition was quite fierce at times among telephone companies. Over all, the competitive practices of the Bell System seem appropriate, given the times and the accepted business practices of the times.¹⁶

In addition to these competitive practices, Vail had developed by this time a philosophy espousing AT&T as the single national monopolistic telephonic and telegraphic communications system. (Early in 1900, American Bell transferred all the investments of its subsidiaries to the American Telephone & Telegraph Company and the following year the two companies consolidated, with AT&T becoming the parent holding company.)¹⁷ Consequently in 1909, AT&T decided to enter the telegraph industry by acquiring control of Western Union. Vail gave some of the following reasons for the purchase which was accomplished the same year:

...if Western Union were controlled by the telephone company, all of its lines could be utilized to a greater or lesser extent for toll lines and long distance telephone business. The telephone company will be obligated to spend a great many millions of dollars, fully as many as the telegraph company will cost, to provide toll line facilities which could be largely avoided if it had the use of Western Union facilities, or the control rather - as the mere use, without the absolute control, would be of no account.¹⁸

Due to AT&T's continuing competitive practices, its policy of acquisition of independents, its refusal to interconnect its "long lines" with independents and the Panic of 1907, the ITC's market share started to wane. In combination with the control of Western Union, AT&T was on its way toward the single national system it wanted.

"The combined telephone-telegraph operations were short-lived."¹⁹ Complaints from ITC's and from the Postal Telegraph Company prompted an investigation by the ICC which had been granted broad powers by the Mann-Elkins Act of 1910 to regulate interstate and foreign telephone and telegraph services.

Debated and negotiated for several years, and in response to a threatened antitrust suit by the Wilson Administration, AT&T capitulated. In a letter from N. C. Kingsbury, vice-president of AT&T, to the Attorney General of the United States in December 1913, AT&T agreed to sell its Western Union stock, agreed to interconnect with those ITC's which met its equipment standards and finally promised not to acquire control of competing telephone companies.²⁰

Thus after a period of several decades in which the telephone and telegraph industries had virtually been developing as separate entities, an attempt had been made by AT&T to merge the two public systems. After four tumultuous

years the effort had been repudiated and "as a result of the government's insistence upon competition, or at least multiple companies, and AT&T's compliance therewith, the system was divided for approximately two decades into telephone (voice) and telegraph (record) communications."²¹

The passage of the Willis-Graham Act in 1921 rescinded the "Kingsbury Commitment." Therefore that part which dealt with not acquiring competing telephone companies was invalidated and AT&T's expansion plans resumed again, however acquisition was subject to approval by state public regulatory agencies. This was followed in 1922 by the Hall Memorandum (named for E. K. Hall, a vice president of AT&T) which explained AT&T's acquisition policy as one opposed to purchases or mergers with connecting or duplicating companies "except in special cases." It read in part:

We should consider that such an exception was proved only in cases where it seemed to be demanded either:

(1) For the convenience of the public as evidenced by the wishes of State authorities or by local public sentiment or in adjoining the territory served; or

(2) By special reason which made the transaction seem desirable and essential from the point of view of the protection of our own property or the general public service.²²

The Hall memorandum continues to reflect AT&T's acquisition policy.²³

One final note on this period of development in the telephone and telegraph industries requires attention and that is government regulation. In addition to the newly granted regulatory powers of the ICC and the Willis-Graham Act, this period saw the Sherman Act interpreted by the Supreme Court and the passage of the Clayton Act by Congress in 1914, two events which would have a significant impact in subsequent antitrust dealings. Section 2 of the Sherman Act permits different interpretations - "is it a crime to have a monopoly, to seek a monopoly, or to seek and get a monopoly."²⁴ In 1911, the Supreme Court ruled that Standard Oil and American Tobacco were guilty under sections 1 and 2 of the Sherman Act and ordered their dissolution into separate firms. In effect, the Supreme Court indicated that under the Sherman Act the two giant companies had "unreasonably" restrained trade - it was not just because they had restrained trade but because they had done so unreasonably. Thus the Sherman Act in outlawing "every ... combination ... in restraint of trade" was not interpreted to be a sweeping ban.

In a further ruling, in the U.S. Steel case in 1920, the Supreme Court found U.S. Steel innocent of any wrongdoing in restraint of trade. In the Supreme Court's words ... "the law does not make mere size an offense or the

existence of unexerted power an offense." "Only monopolizing, and not monopoly, constituted an offense."²⁵

Finally the Clayton Act of 1914 was passed to lend further substance and definition to the Sherman Act and the subject of restraint of trade. The Clayton Act focus is more on the conduct of individual firms whereas the Sherman Act concerns conspiracies or agreements among firms.

C. 1923 - 1945

AT&T's horizontal merger policy, begun again in 1921-1922 after the termination of the "Kingsbury Commitment" by the Willis-Graham Act, continued through the 1930's in accordance with the Hall Memorandum. AT&T purchased only distressed companies or those ITC's in areas where duplication of facilities existed, in both cases with the permission of state regulatory officials.

State officials were particularly lenient in permitting mergers of companies serving the same cities. By this time, the idea that duplication of operating companies was uneconomic had become widely accepted; the public was inconvenienced by the necessity to have two telephones in homes and offices in order to be sure of having complete communication service. Philadelphia was the last major market to permit duplication; in 1943, its two companies were merged.²⁶

In 1924 a significant organizational change occurred at AT&T. Bell Telephone Laboratories, Inc. was established to take over the product development engineering department

and a portion of the patent department at Western Electric. AT&T's research and development department was transferred to Bell Labs in 1934. Well-known for its scientific discoveries and innovations, including the transistor, it is half owned by AT&T and Western Union respectively.

A committee was established by the Secretary of Commerce in 1933 to study communications regulation. The result of the study was a recommendation for a single agency to regulate all communications services, and thus the sequence of events was begun which ended in the passage of the Communications Act of 1934 and the creation of the Federal Communications Commission (FCC). As amended in 1937, the purpose of the Act was to regulate interstate and foreign communication by wire and radio.

So as to make available, so far as possible, to all the people of the United States a rapid, efficient, Nation-wide and world-wide wire and radio communication service with adequate facilities at reasonable charges, for the purpose of the national defense, for the purpose of promoting safety of life and property through the use of wire and radio communication, and for the purpose of securing a more effective execution of this policy by centralizing authority with respect to interstate and foreign commerce in wire and radio communication²⁷

Specific responsibilities were given to the FCC regarding the regulation of rates, practices, classifications, accounting systems, depreciation charges and required records and reports.

One of the first major actions of the FCC, prompted by Congress, was a comprehensive investigation of the telephone industry. Undertaken in 1935, the FCC spent four years on the study, reporting out in 1939 with its major findings:

The concentration of the Nation's telephone business, and in particular of its interstate telephone business, in the hands of the Bell Telephone System is such that whereas the problem of regulation is one of large magnitude, it is relatively simplified by reason of this very integration, as contrasted with the railroad, gas, electric-power, maritime, and motor-carrier fields of Federal regulatory effort. The fundamental problem underlying the provision of effective regulation in the interstate telephone field appears to consist largely of developing ways and means, as well as positive and effective machinery, for the continuous acquisition of the basic factual data, and of providing methods for the prompt and adequate digestion and analysis of such facts in such form and manner as to render Commission action thereon readily possible.²⁸

Essentially a quasi-judicial ratification of AT&T's development to date, the study was a significant compilation of data concerning the industry and made it possible for the FCC to institute its policy of "continuous surveillance": regulatory decision-making relying heavily upon informal hearings, discussions and procedures backed-up by a solid data base, rather than public hearings convened periodically to collect data and render formal decisions.

Meanwhile, one of the two major telegraph companies had fallen upon hard times. Following the stock market crash of 1929, the Postal Telegraph Company had experienced increasingly

larger annual deficits. At this time Postal Telegraph handled about 15 per cent of the domestic telegraph traffic. In 1940 the FCC recommended the consolidation of existing telegraph carriers into one unified system. Three years later, Congress passed the Domestic Merger Act, authorizing Western Union's acquisition of the Postal Telegraph Company and additionally authorizing the merged company to acquire the telegraph facilities of any carrier not principally a telegraph carrier. Thus the door was opened for Western Union to try and acquire AT&T's Teletypewriter Exchange (TWX) private line services.

The negotiations opened that same year and continued for a period of two years. Late in 1945, however, Western Union's financial ability to acquire the facilities was impaired by reason of retroactive wage increases ordered by the War Labor Board. That order practically wiped out the company's financial reserves and materially increased its future operating costs.²⁹

Negotiations were not resumed until 1964.

A major change to the previous rulings of the Supreme Court in antitrust matters occurred in 1945 when the court ruled in U.S. v. Aluminum Co. of America that Alcoa had violated section 2 of the Sherman Act by monopolizing the manufacture of newly refined aluminum. "For the first time, the Court took the view that a high level of seller concentration itself could constitute a violation of Section 2."³⁰

The Supreme Court had decided that a 90 per cent concentration level was "high" enough - a standard had been set; whether or not it was the correct standard, the fact remained that "a standard centering on market structure replaced one which depended essentially on market conduct."³¹

D. 1946 - 1956

"After World War II, the market for communications services changed greatly."³² The demand for telephonic services increased markedly while the demand for public message service declined severely. Additionally business demanded new types of communication services to satisfy the expanding network of their operations: such services as private teletypewriter exchange, alternate voice/record, and voice/data services. As previously mentioned Western Union had merged with the Postal Telegraph Company and was also attempting to acquire AT&T's TWX services when negotiations had to be terminated. The point to remember is that because of the decline in public message service, Western Union was attempting to broaden its base as the sole "public" record communications common carrier. In fact it was depending heavily upon AT&T in the provision of record communications because Western Union increasingly replaced its obsolete inter-city lines with leased lines from AT&T. Western Union also had to

utilize AT&T terminal equipment when using AT&T leased lines in the provision of alternate voice/record or voice/data services. We thus have the situation of the dominant voice common carrier helping to maintain the viability of the record communication common carrier. Not until the 1960's when Western Union's microwave installations were installed across the country did the reliance upon AT&T's inter-city leased lines decline.

The conversion from coaxial cable to microwave which occurred around 1946 was a landmark event in the telecommunications industry. Microwaves are very short waves which utilize the upper regions of the radio spectrum above 890 megahertz and are well-suited for bulk point-to-point communications traffic. Additionally the absence of pole line rights-of-way; minimal expansion cost; and flexibility in circuit use among data, voice and video made it a very attractive alternative to open wire transmission. As we shall see, the alternative opportunities presented by microwave technology coupled with eventual FCC regulatory decisions subsequently led to the creation of private and public microwave systems independent of the traditional landline companies. This subject will be covered in greater detail in the discussion of the next historical period.

In January of 1949, the Department of Justice filed an antitrust suit against AT&T and Western Electric, the essence of the charge being that the two companies had monopolized "the production, manufacture, distribution, sale, and installation of telephones, telephone apparatus, telephone equipment, telephone materials, and telephone supplies,"³³ in violation of the Sherman Act. The government was attacking the vertically integrated relationship between AT&T and Western Electric, stating that AT&T had accomplished the alleged monopolization

(1) by vesting in Western the exclusive right to manufacture and sell such equipment to such operating companies and to the Long Lines Department of AT&T;

(2) by requiring such operating companies and the Long Lines Department of AT&T to purchase their required equipment exclusively from Western³⁴

The government charged that the principal evils created by this monopolization were excessive charges to the operating companies of AT&T and delays in the introduction of cost-reducing innovations, because of the absence of competition. In its suit, the remedy sought by the Department of Justice was the compulsory licensing of all applicants under Bell System patents at reasonable royalties; the break-up of Western Electric into three separate companies; and a dissolution of the tie between Western Electric and AT&T,

with the requirement thereafter that the AT&T operating companies be required to employ competitive bidding in all purchases of equipment, materials, and supplies.³⁵

The case never went to trial and was surrounded by considerable political pressure on all sides. In 1956 a consent decree was signed which essentially left the relationship between AT&T and Western Electric intact. "The remedies in this part of the case were directed toward making regulation rather than competition more effective."³⁶

Lastly we will set the stage for one of the major events of the late fifties and early sixties. In 1954 the Central-Freight Company, a Texas trucking company, and the Minute-Made Corporation, a citrus processing firm, applied for licenses to build, own and operate their own microwave systems. This was a direct challenge to the then current policy of the FCC to deny applications from private concerns for communication services where common carrier facilities from the traditional landline companies were available to them. The FCC's policy was primarily influenced and shaped by the common carriers who opposed the application for private systems on the grounds that the radio spectrum was not infinite and that congestion of the air waves would ensue as well as higher cost and poorer service. In the face of this the private applicants demonstrated that, in fact,

construction of their own communication facilities would mean lower costs than the common carrier's existing tariffs.³⁷

E. 1957 - 1971

This period of time offers the beginning acts in the drama currently unfolding in the telecommunications industry concerning "selected competition," or the introduction of competition to areas once considered secure under the umbrella of "natural monopoly." The pressure from private concerns for liberalization of the aforementioned policy restricting the construction of private communications systems, specifically microwave, was lifted by the FCC in the "Above 890" decisions of 1959 and 1960.³⁸ Citing the many applications, ... "and concluding that there were adequate frequencies above 890 megacycles to take care of present and reasonably foreseeable future needs of both the common carriers and private users, it deprecated the threat to the common carriers and emphasized the advantages of competition in spurring the development of communications technology."³⁹ (Units of frequency measurement have changed from the time of the initial "Above 890" decisions from cycles to hertz.)

The "Above 890" decisions thus centered on the crux of the question of whether the public would be better served by elements of competitive entry or by the established

common carriers on the other hand. The "Above 890" decisions involved private users only. A more competitive threat to the common carriers "bread and butter" came in 1964 when Microwave Communications, Inc. (MCI) applied for FCC approval to operate public point-to-point microwave communications service between Chicago and St. Louis. For five years afterwards, charges and contentions ensued between the common carriers and the "upstarts" like MCI and although what MCI proposed was a direct duplication of Bell and Western Union facilities, "it offered two things that the Bell companies and Western did not: first, low rates - its proposed charges were less than half those of the established carriers - and second, far greater freedom and flexibility in use of the service: customers could attach such equipment as they saw fit and up to five of them could share the use of a single channel, thus further reducing the cost of each."⁴⁰

It was these final two points which in the end persuaded the FCC to grant MCI its license. After the ruling, the FCC was deluged with similar requests, among them that of the Data Transmission Company (DATRAN). These new public common-carriers, principally in the microwave communications service, came to be known as the specialized common carriers (SCC's). The responses of the established carriers during

this period (1960-1968) of "selected competition" approved by the FCC, included all the legal and economic arguments for the traditional monopolistic communications service; charges that the SCC's were "cream skimming" the lucrative routes; and the introduction of such new services as TELPAK, Wide Area Telephone Service (WATS), Dataphone Digital Service and the Series 11,000 Tariff. These will be discussed further in Chapter Four.

With the potential for generating far greater turmoil in the telecommunications industry than microwave technology before it, communications satellites came to the fore in July 1962 with the launching of Telstar I and the opening of a new era in communications. Suffice it to say that many firms wanted in on the ground floor and the initial questions in the area of communications satellites tended to focus on the corporate vehicle with which to bring communications relay by satellite into commercial operations.⁴¹ The overseas carriers (RCA Globcom, Western Union International, International Telephone & Telegraph, etc.) sought joint satellite ownership as an extension of existing carrier submarine cables. They would lease circuits to the carriers individually who in turn would make them available to the public for voice or record traffic. On the other hand there were aerospace companies such as General Electric and

Lockheed which "called for the creation of a carrier's carrier and argued that the entity's ownership should include equipment suppliers and the public at large, as well as the overseas carriers."⁴² With both the constricted ownership proposal of the overseas carrier and the broadened ownership proposal of the aerospace firms in contention, the FCC and Department of Justice debated the merits of the issues at length but eventually the FCC view prevailed that a joint non-profit organization would be formed whose ownership would be assigned to the existing overseas carriers.

The entity would sell satellite circuits to the overseas carriers and would agree to purchase hardware and related suppliers on a competitive bid basis ... The carriers obviously regarded competitive procurement as a trade-off to satellite ownership.⁴³

Thus in 1962 Congress passed the Communications Satellite Act establishing the Communications Satellite Corporation (COMSAT) whose ownership would be divided equally between the overseas common carriers and the investing public. The issue of domestic satellite (DOMSAT) ownership and the establishment of a DOMSAT system were not resolved at this time.

As mentioned previously, message telegraph volume began to decline after World War II. In fact, from 1945 to 1966, the volume of message telegraph service fell 70 per cent and the number of telegraph offices declined 41 per cent,

while eleven rate increases resulted in a cumulative increase of 160 per cent in the price of public message service between 1945 and 1964.⁴⁴ Yet the actual volume, 70.2 million message telegraphs in 1966, indicated a continuing large demand for the service. Because of this decline in telegraph volume the FCC instituted a study of the telegraph industry in 1962, which sought to answer the question of whether the decline was in response to the price system and changing consumer desires or due to forces distorting the rate relationships between message telegraph and substitute services.⁴⁵ The report of the Telephone and Telegraph Committees (which conducted the inquiry for the FCC) found that:

(1) Western Union rationalized price increases because of wage increases and needed revenues to support diversification in Telex (its public switched teletypewriter network) and private telegraph lines but as the increased prices of public message service came into line with higher quality alternative communications, old users of Western Union began to divert so that subsequent rate increases were never sufficient

(2) the Bell System imposed interconnection restrictions on Western Union which limited Western Union's ability to compete in private line fields, and

(3) the Bell System, through its pricing practices had adversely affected Western Union's growth.

The FCC's Telephone and Telegraph Committees, in their final report in April 1966, called the Domestic Telegraph

Investigation, called for several steps to make Western Union a viable entity. (Note: in 1963, Western Union was divided into two companies, Western Union Telegraph Company and Western Union International, both subsidiaries of Western Union Corporation. Discussion of Western Union hereafter will refer to the Western Union Telegraph Company, which is the domestic telecommunications operation of Western Union Corporation.) These steps included transferring Bell's TWX service to Western Union; elimination of interconnection restrictions that prevented Western Union from competing effectively with the Bell System in the provision of private line services; and precluding AT&T's re-entrance into the exchange telegraph market by making an exchange teletype-writer offering available over its public switched network.⁴⁶ The sale of TWX to Western Union was finally consummated in April 1971. As already mentioned negotiations had originally begun in 1943! Final sale had been contingent upon assurances from the FCC to AT&T that the FCC "would not construe the sale as acquiescence by AT&T in a program calling for complete separation of voice and record services."⁴⁷

In October of 1965, the FCC began its second formal investigation of the telephone industry. Several problems formed the basis for the investigation, among them the "Seven-Way Cost Study," Western Electric's prices and profits,

and rate base items. The "Seven-Way Cost Study," submitted to the FCC by AT&T in 1964 in connection with the Domestic Telegraph Investigation, revealed that in the Bell System's seven interstate services, the profits from the competitive services - TWX, private line, and TELPAK - averaged 2.9, 1.4, and 0.3 per cent respectively while in Bell's non-competitive services - WATS, for example - profits averaged 10 per cent.⁴⁸ (These percentages are expressed in terms of the ratio of net operating earnings to net investment.) "The study was obviously laden with controversy; but the evidence was highly persuasive that Bell had employed its monopoly markets to underwrite losses in its competitive markets."⁴⁹ The FCC subsequently divided the investigation into several phases, however one of its most important conclusions stated that the Bell System's rate of return on interstate and foreign communication services should be in the 7 to 7.5 per cent range.

The policies against foreign attachments and interconnection to the Bell System which AT&T practiced over the years was challenged in the Carterfone proceedings of the 1960's. Remember that AT&T had consented in the Kingsbury Commitment of 1913 to interconnect where the attachments measured up to AT&T quality specifications. However a general attitude still continued at AT&T to prohibit interconnection in all

but "unusual merit" cases. Even though the Hush-A-Phone Case demonstrated both a demand by consumers and the fact that the device would not impair the telephone network, AT&T continued to interpret the court's ruling against a flat prohibition of foreign attachments narrowly.⁵⁰ (The Hush-A-Phone was a purely mechanical cuplike device which could be snapped on to the telephone and, by confining the speaker's voice to its enclosure, provided privacy for the conversation of the speaker.)⁵¹ The next challenge to AT&T on the issue of foreign attachments came from Carter Electronics Corporation which sued AT&T and the General Telephone & Electronics Company (GTE - the major telephone company independent) in 1966 over the use of its Carterfone. The Carterfone was a cradle-like instrument which utilized an acoustic/inductive mechanism to interconnect private radio communications with the Bell System or independents by placing the conventional telephone headset in the cradle.⁵² The Federal District Court in Texas referred the regulatory issue to the FCC and in 1968 the FCC ruled that the tariff provisions of AT&T and GT&E prohibiting foreign attachments were unreasonable, unlawful and discriminatory, and ordered the provisions stricken from the tariffs. Thus the door opened all the way for terminal manufacturers who could now interconnect their computer equipment with the public switched

telephone network provided the quality parameters had been satisfied. (Note: it should be pointed out that, historically, certain classes of users, such as the railroads and the military, even prior to "Carterfone," have been permitted to interconnect with the telephone system with no documentation of network harm.)⁵³

One major antitrust event occurred during this period when the Department of Justice filed an antitrust suit against ST&E in 1964 to block GT&E's acquisition of several independent phone companies on the west coast. The Department of Justice contended that the acquisition would foreclose the communications equipment market to independent manufacturers.⁵⁴ However in light of the consent decree signed by AT&T in 1956, the suit was eventually withdrawn on the grounds that it was incompatible with the AT&T ruling.

The final event of significance during this period was the establishment of and report of the President's Task Force on Communications Policy. President Johnson announced the appointment of the Task Force in 1967 and directed it to make a comprehensive study of both the domestic and international communications posture of the United States. Its report was issued in 1968 and with respect to domestic communications policy dealt substantively with the areas of

DOMSATS, the domestic telecommunications carrier industry and the establishment within the Executive Branch of the federal government of a telecommunications capability. This capability is currently represented by the Office of Telecommunications Policy (OTP).

F. 1972 - PRESENT

The past several years have generally seen the attention of the telecommunications industry focus around the following general areas: the advent and development of competitive DOMSAT programs, the ever growing trend toward the merging of data communications and data processing, and just recently a concerted, well-financed effort by the established common carriers to legislatively repeal the competitive gains in the industry won by the SCC's in recent years.

Since 1972 when the FCC announced its "Open Skies" policy toward the development of DOMSATS and thus opened the floodgate for a deluge of applications, the established common carriers and overseas carriers as well as new interested concerns have been striving hard to develop their own systems and get them launched and operational. Eight applications were originally filed with COMSAT-General, a subsidiary of COMSAT, for the development of DOMSATS and five of these were later given the approval of the FCC. They were COMSAT-

General together with AT&T; Western Union; the American Satellite Corporation; GT&E; and RCA Global Communications, Inc. CML, a combine of COMSAT-General, MCI and Lockheed, was tentatively approved by the FCC for DOMSAT development but the concern had no definitive plans. GT&E eventually merged its efforts with the COMSAT-General and AT&T team.⁵⁵ CML later went through a restructuring with International Business Machines Corporation (IBM) purchasing 55 per cent of the stock with COMSAT-General retaining the remainder. The FCC has ruled that IBM and COMSAT-General can each only own a maximum of 45 per cent of the stock so a third partner has been sought and in January 1976, joined by Aetna Life and Casualty Insurance Company, the trio won FCC approval for the launching of a \$250 million DOMSAT system in what has been described as a major challenge to AT&T's dominance of domestic communications.⁵⁶ The new company will be known as Satellite Business Systems (SBS).

The Consumer Communications Reform Act (CCRA) of 1976, satirically referred to as the Monopoly Protection Act of 1976, has been introduced in both houses of Congress and will come up for a vote probably in 1977. In a well-lobbied effort,^{57,58} AT&T has sought passage of the act which will have a detrimental effect on the limited competition encouraged in the telecommunications industry by the FCC ever

since the 1960's. The CCRA would principally do two things: first, not permit the operation of a SCC's communication network where it geographically duplicates the network of an established common carrier and secondly make the individual state regulatory commissions rule separately on the quality and appropriateness of a manufacturer's or SCC's terminal equipment. The administrative expense of the latter proposal is very prohibitive especially as it would effect small SCC's. Thus the CCRA is viewed with apprehension by the SCC's who could very well go out of business due to its passage.

A major antitrust suit was launched by the Department of Justice in November 1974 calling for the breakup of AT&T, charging that the Bell System has monopolized the markets for telecommunications services and related equipment. Essentially the suit says that AT&T's first priorities have tended to favor policies that protect its markets and ensure its monopoly at the expense of supplying the most efficient and economical service to the public.^{59,60} The suit has just cleared jurisdictional litigation and the Supreme Court has ruled that a Federal District Court in Washington, D. C. has jurisdiction on the suit, rather than relegating it to the FCC. This was a direct repudiation of AT&T's arguments. The antitrust suit will now go to trial March 1, 1977.⁶¹

G. CURRENT INDUSTRY MAKE-UP

The past pages have presented an abbreviated survey of some of the notable events in the development and growth of the domestic telecommunications industry. The telegraph industry is headed by Western Union which through diversification into private line service and satellite relay is attempting to remain a "viable entity." The Bell System, AT&T, serves over 123 million telephones as of 1976. It has a net plant investment of \$70 billion; total operating expenses exceed \$18 billion and net operating revenue exceeds \$10 billion (all figures from 1975). Bell accounts for over 90 per cent of long distance telephone calls and 82 per cent of local exchange service in the United States. Western Electric accounts for 70 per cent of the domestic production of communications equipment. The nation's 1,618 independent telephone companies serve over 26 million telephones in all states except Rhode Island and Delaware.^{62,63,64} The largest of the independents, GT&E, is often referred to as "Baby Bell" although its financial figures are relatively small compared to AT&T. GT&E does serve the entire state of Hawaii however and the ITC's service such major cities as Rochester, New York; Tampa, Florida; Lincoln, Nebraska; and Santa Monica, California.

The structure, conduct and performance of the common carriers will be discussed in succeeding chapters.

III. STRUCTURE OF THE UNITED STATES TELECOMMUNICATIONS INDUSTRY

A. INTRODUCTION

The United States domestic telecommunications industry, as indicated previously, consists of several sectors, each of which provides a variety of telecommunications services.

They are:

1. The telephone sector
 - Bell System
 - Independents
2. Telegraph sector (Western Union only)
3. Other common carriers (OCC's)
 - specialized common carriers (SCC's)
 - value added networks (VAN's)
 - domestic satellite carriers (DSC's)
4. Public Land Mobile Radio Common Carriers (RCC's)
 - telephone companies
 - other firms
5. Non-telephone interconnect companies (IC's), i.e.
PBX and KTS equipment.

Table 3-1 is a compilation of significant data for each of these sectors; it shows the number of companies, operating

TABLE 3-1
The Telecommunications Industry of the U.S.

	Number of Companies				Operating Revenues (\$000)				Total Communications Plant (Gross in \$000)			
	1960	1965	1970	1975	1960	1965	1970	1975	1960	1965	1970	1975
1. Telephone												
a. Bell System 1/	25	25	25	25	8,108,806	11,327,928	17,327,928	29,581,647	24,721,830	36,228,981	56,171,376	89,194,378
b. Independents 2/	3,299	2,421	1,841	1,618	1,008,451	1,638,264	2,891,814	5,500,000	3,970,578	6,825,867	12,390,327	21,000,000
2. Telegraph												
a. Domestic 1/	1	1	1	1	262,365	305,615	402,456	504,760	398,023	688,757	1,029,149	1,581,052
3. Private Line Services 13/												
a. SCC's	-	-	-	9	-	-	-	34,944 2/	-	-	-	166,611 2/10/
b. VAN's	-	-	-	24/	-	-	-	204/	-	-	-	3,020 2/4/
c. DSC's	-	-	-	3	-	-	-	16,300 4/	-	-	-	205,000 2/
4. Public Land Mobile Radio Service 8/												
a. Telephone Companies	111	281	396	351)	11,100	20,900	22,200	61,305 3/	-	-	-	60,090 3/2/
b. Other Firms	409	423	489	434)								
5. Non Telephone Company PBX and KTS Equipment	-	-	-	11/	-	-	-	143,000 12/	-	-	-	11/
6. Total	3,845	3,151	2,752	2,443	9,390,922	13,282,707	20,681,109	35,041,976	29,094,431	43,743,605	68,913,337	112,210,549

Note: figures are in calendar year \$

Table 3-1 (Continued)

- 1/ Statistics of Communications Common Carriers, 1960, 1965, 1970 and 1975
- 2/ Independent Phone Facts for 1976 (USITA)
- 3/ December 1974. Figure for 1975 not available.
- 4/ Communications with company officials.
- 6/ The figures are for Dec. 1974 from "Statistical Summary of the Results of Operations During 1972, 1973 and 1974 of Miscellaneous Microwave Common Carriers," F.C.C., Common Carrier Bureau, Economics Division.
- 7/ Figure is net plant.
- 8/ Number of stations.
- 9/ FCC Form P's for 1975.
- 10/ MCI Telecommunications Corporation shows zero communications plant in their FCC Form P for 1975. They lease all plant for MCI Leasing Corp., a subsidiary of MCI Leasing Corp., a subsidiary of MCI Communications Corp.
- 11/ No data available on the total number of companies producing PBX and KTS equipment or the amount of plant investment devoted to PBX or FTS production. There are roughly 30 main manufacturers of PBX equipment.
- 12/ This is a rough estimate using some actual data for the Bell System (Exhibits) and some projected figures for the IC in independent territory.
- 13/ Other than telephone companies and Western Union which are included in 1 and 2.

revenue, and total communications plant assets from 1960 to 1975 in 5-year intervals.

Table 3-1 shows that the overwhelming core of the industry consists of the telephone common carriers which are privately owned and governmentally regulated. In 1975 the telephone sector accounted for almost 97 per cent of the operating revenue and slightly over 97 per cent of the total communications plant of the entire industry;⁶⁵ the remaining 3 per cent consist of the other five sectors combined. For this reason, this chapter will emphasize the structural elements of the telephone sector, and examine briefly the other sectors at the end of the chapter.

An industry's conduct and performance are ultimately determined by its structure; this chapter will examine the important elements of structure in the domestic telecommunications industry. In his textbook on industrial organization Joe S. Bain defines market structure as "...Those characteristics of the organization of a market that seem to exercise a strategic influence on the nature of competition and pricing within the market."⁶⁶ Many elements of market structure could be studied. John M. Vernon in Market Structure and Industrial Performance: A Review of Statistical Findings proposes a list of over sixteen elements of market structure; however he accurately points out that "the length of this

list and the ease with which it could be extended raise a methodological problem concerning the hypothesis that market structure determines conduct and performance."⁶⁷ Our attention will be confined to only four main elements of structure:

1. The degree of concentration

- the number and size distribution of sellers and buyers in the market

- vertical concentration and its implications

2. The character and importance of product differentiation

3. Conditions of entry to the market

4. Regulation.

(Historically, the telecommunications industry has been subject to both federal and state regulation. Regulation can be considered under barriers to entry; however regulation has had such a tremendous impact on the structure of this industry, it will be discussed as a separate element. Indeed, it is this important factor which separates the telecommunications industry from other domestic industries such as large steel companies, drug manufacturers and automobile producers.) Bain addresses the use of these important elements (degree of seller concentration, degree of buyer concentration, degree of product differentiation and condition of entry) stating:

At times, market structure has been defined more broadly--e.g., as 'The economically significant features of a market which affects the behavior of firms in the industry supplying the market.' So construed, market structure could embrace every objective circumstance - psychological, technological, geographical or institutional - that might conceivably influence market behavior. According to this definition every market has a multitude of characteristics, and every market is in some degree structurally unique. We do not espouse this concept of market structure here because a very loose and frequently ambiguous use of the idea of structure is involved, and also because meaningful intermarket comparisons and meaningful generalizations about the influence of structure on behavior are effectively forestalled if the content of 'structure' is made so comprehensive that no two markets can be viewed as structurally alike.⁶⁸

B. CONCENTRATION OF THE INDUSTRY

Concentration is an operational measure which refers to the number and size distribution of firms; it offers a way to locate an industry somewhere in the realm of two extremes, monopoly and competition. The number of firms or establishments in an industry tells us little; it is size in relation to the market which is of prime importance, i.e. we want to know the share of an industry accounted for by the largest firms in the industry.

All goods and services sold in the United States are classified under a United States Census Standard Industrial Classification (SIC) System. (See U.S. Bureau of the Budget, Standard Industrial Classification Manual; Washington, D.C., U.S. GPO 1967). The following Standard Industrial

Classification (SIC) codes are used to define the telecommunications industry:

<u>Group No.</u>	<u>Industry No.</u>	<u>Title</u>
366		Radio, television and communications equipment, and electronic components and accessories
	3661	Telephone & Telegraph apparatus
481		Telephone communications
	4811	Telephone communication (wire or radio)
	4821	Telegraph communication (wire or radio)

The 366 Group No. is the manufacturing or equipment market for telecommunications; the 481 Group No. is the communications services which are provided and is considered the traditional as well as predominant classification for communications.

Many different private marketing and management service companies (Moody's, Standard and Poors, Dun and Bradstreet, COMPUSTAT, Fortune, Forbes) and government agencies (Department of Commerce, Securities and Exchange Commission, Federal Communications Commission) compile industry information by SIC codes. A review of these and other publications highlight two important facts:

1. As mentioned previously, the telecommunications industry is dominated by and highly concentrated in the telephone sector (this aspect will be covered next).
2. Until recently, there were few companies which manufactured telecommunications equipment.

1. The Telephone Sector

The telephone sector consists of two segments:

- (1) The American Telephone and Telegraph Co. (AT&T) -- commonly referred to as the Bell System
- (2) 1,618 independent telephone companies (ITC's).

The number of companies suggest that this sector would fall closer to the competition extreme rather than monopoly; however, number of companies alone indicates little and can be very misleading. A statistical summary of the telephone sector in the United States from 1966 to 1977 is presented in the following tables:

Table 3-2 shows the number of telephones and employees in the independents and the Bell System, plus their total over a 10-year period (1966-1975). It also shows the total operating revenue and total investment in plant, with similar breakdowns.

From this table, it is apparent the Bell System dominates the telephone sector, providing 82 per cent of the

TABLE 3-2

	Independents	Bell System	Total Bell & Independents
TELEPHONES (000 Omitted)			
1975	26,823	121,800	148,623
1974	25,826	118,146	143,972
1973	24,351	113,960	138,311
1972	22,796	108,811	131,607
1971	21,444	103,698	125,142
1970	20,312	99,902	120,214
1969	19,254	95,942	115,196
1968	18,125	91,122	109,247
1967	16,953	86,776	103,729
1966	15,975	82,813	98,788

The per cent breakdown for Number of Phones in 1975:

* 82% The Bell System

* 18% The Independents

	Independents	Bell System	Total Bell & Independents
EMPLOYEES			
1975	158,000	788,000	946,000
1974	163,000	812,000	975,000
1973	161,000	818,200	979,200
1972	155,000	797,200	952,200
1971	151,367	796,500	947,867
1970	147,704	793,200	940,904
1969	138,417	755,000	893,417
1968	129,430	696,700	826,130
1967	121,410	673,300	794,710
1966	115,028	667,000	782,028

The per cent breakdown for Number of Employees in 1975:

* 83.3% The Bell System

* 16.7% The Independents

Source: USITA Telephone Statistics, Vol. 1, 1976.

Independents	Bell System	Total Bell & Independents
--------------	----------------	------------------------------

TOTAL OPERATING REVENUES (\$000 omitted)

1975	\$5,500,000	29,590,723	\$35,090,723
1974	4,920,000	26,761,000	31,681,000
1973	4,316,990	24,072,000	28,388,990
1972	3,788,699	21,388,000	25,176,699
1971	3,322,679	18,951,983	22,274,662
1970	2,891,814	17,368,544	20,260,358
1969	2,564,881	16,057,756	18,622,637
1968	2,261,790	14,428,866	16,690,656
1967	1,987,043	13,310,606	15,297,649
1966	\$1,843,976	12,419,140	\$14,263,116

The per cent breakdown by Total Operating Revenues in 1975:

* 84% The Bell System

* 16% The Independents

Independents	Bell System	Total Bell & Independents
--------------	----------------	------------------------------

TOTAL INVESTMENT IN PLANT (000 omitted)

1975	\$21,200,000	89,194,378	\$110,394,378
1974	19,600,000	82,700,000	102,300,000
1973	17,418,533	75,520,000	92,938,533
1972	15,555,142	68,492,000	84,047,142
1971	13,958,567	62,049,465	76,008,032
1970	12,390,327	56,171,376	68,561,703
1969	11,001,144	50,525,650	61,526,794
1968	9,774,435	46,137,147	55,911,582
1967	8,699,648	42,556,611	51,256,259
1966	\$ 7,737,335	39,366,859	\$ 47,104,194

The per cent breakdown by Total Investment in Plant in 1975:

* 81% The Bell System

* 19% The Independents

Source: USITA Telephone Statistics, Vol. 1, 1976.

domestic telephone services as measured by the number of phones, and its operating revenue accounting for about 84 per cent of the telecommunications industry. The ITC's provide the remainder 18 per cent of the domestic telephone service (as measured by number of phones) and account for about 16 per cent of domestic operating revenue.⁶⁹ The statistics for the independent telephone companies are somewhat misleading. There are 1,618 independent telephone companies in the United States. Most of them are small, non-affiliated companies which include cooperatives and municipal systems; however, among them there are three (3) companies which control over two-thirds of the independent telephone market. They are General Telephone and Electronics (GTE alone controls almost half of the independent telephones), United Telecommunications Inc. and Continental Telephone Corporation. Table 3-3 is a breakdown by number of phones, operating revenues, and total investment in plant, of these three "holding companies" compared against the total ITC's.

AT&T (the Bell System) plus these three independent companies control approximately 95 per cent of the nation's telecommunications market (as measured by number of phones); the telecommunications industry is highly concentrated in the telephone sector and in turn, the telephone sector is itself highly concentrated.

TABLE 3-3

	General Telephone & Electronics (GTE) (1)	United Tele- Communications Inc. (1)	Continental Telephone Corp. (1)	Total Independents (2)
<u>1975</u>				
Number of Telephones	12,285,000	3,381,768	2,164,804	26,823,000
Operating Revenue	2,660,000,000	136,520,000	460,800,000	5,500,000,000
Total Investment in Plant	9,858,000,000	2,708,143,000	1,980,849,000	21,200,000,000

The per cent breakdown for each of the above categories for 1975:

- Number of Telephones
 - * The "big three" independents - 67%
- Operating Revenue
 - * The "big three" independents - 60%
- Total Investment in Plant
 - * The "big three" independents - 68%

Source:

- (1) USITA Holding Company
Report, May 1976
- (2) USITA Telephone Statistics,
Vol. 1, 1976

The most striking feature of the telephone sector is the "vertical integration" among the four major telephone companies previously discussed (AT&T and the three large ITC's). It is this salient feature of structure which gives AT&T and the three independents their predominance in both the equipment and service markets. "Vertical concentration" as John M. Blair states: "refers to operation of a firm in more than one state of the production process, typically involving more than one industry in which materials and services flow successively from an earlier to a later stage of production or vice versa through units under the firm's control."⁷⁰ Each of the four telephone companies are vertically integrated through ownership of a telecommunications manufacturing affiliate. They are:

Telephone Common Carrier
Organization

Manufacturing Affiliate

- | | |
|--------------------------------------|---|
| 1) AT&T (Bell System) | 1) Western Electric |
| 2) GT&E | 2) GTE Automatic Electric
and Subsidiaries (GTE
Automatic) |
| 3) United Telecommunications
Inc. | 3) North Electric |
| 4) Continental Telephone Corp. | 4) Various subsidiaries
organized under Superior
Continental Corp. and
Vidar Corp. |

Conduct and performance are greatly affected by the structural implications of "vertical concentration." To gain a fuller understanding and appreciation of this fact the Bell System structure is examined in detail. (Note: The basic relationship between the Bell System and the independents may be characterized as complementary with most independents serving as local telephone monopolists (where Bell operating companies do not presently reach) interconnecting with AT&T Long Lines and the Bell operating companies. Therefore an examination of GTE, United Telecommunications or Continental Telephone would yield almost identical findings.)

In terms of assets, the Bell System is the largest non-financial corporation in the world.⁷¹ Total assets in 1975 were over 80 billion dollars. Referring back to Table 3-1, the Bell System operating revenues in 1975 were \$29.6 billion and its total communications plant investment was \$89.2 billion. The largest industrial corporation in the United States as ranked by Fortune, May, 1976 is Exxon Corp; in terms of net assets the Bell System is almost $2\frac{1}{2}$ times larger than Exxon Corp. The Bell System has a monopoly of local and toll telephone service in the U.S.; they account for over 85 per cent of its operating revenue. (Most economists, as Bain states, generally agree that control of over 75% of an industry by one firm constitutes a monopoly.) The Bell

System also encompasses virtually all other aspects of the telecommunications industry. It provides the majority of the facilities used in transmission of television and radio programs and is the primary supplier of private line data and voice service. In the Radio Common Carrier Service and interconnect market, the Bell System accounts for over 90 per cent of the total revenues. To get a perspective of the total enormity of the Bell System, if the Bell System were in fact a country in terms of gross national product, it would be the 25th largest in the world.⁷² Figure 3-1 depicts the size of the Bell System in relation to the independent telephone companies and the other five sectors. How is the Bell System structurally defined and what does it encompass?

The Bell System is defined as the American Telephone and Telegraph Co., its principal domestic Bell Telephone Operating Companies (BOC's), the Western Electric Company (WECO) and Bell Telephone Laboratories (BTL). Figure 3-2 depicts the Bell System structure and interrelationships. AT&T exemplifies the holding company in the U.S. telecommunications industry. The main interrelationships are summarized by Manley R. Irwin to be:

AT&T holds all or nearly all of the stock of twenty-one of the largest operating companies in the United States. In addition AT&T holds a substantial stock position in two other operating telephone companies.

1975 Telecommunications Industry Operating Revenues

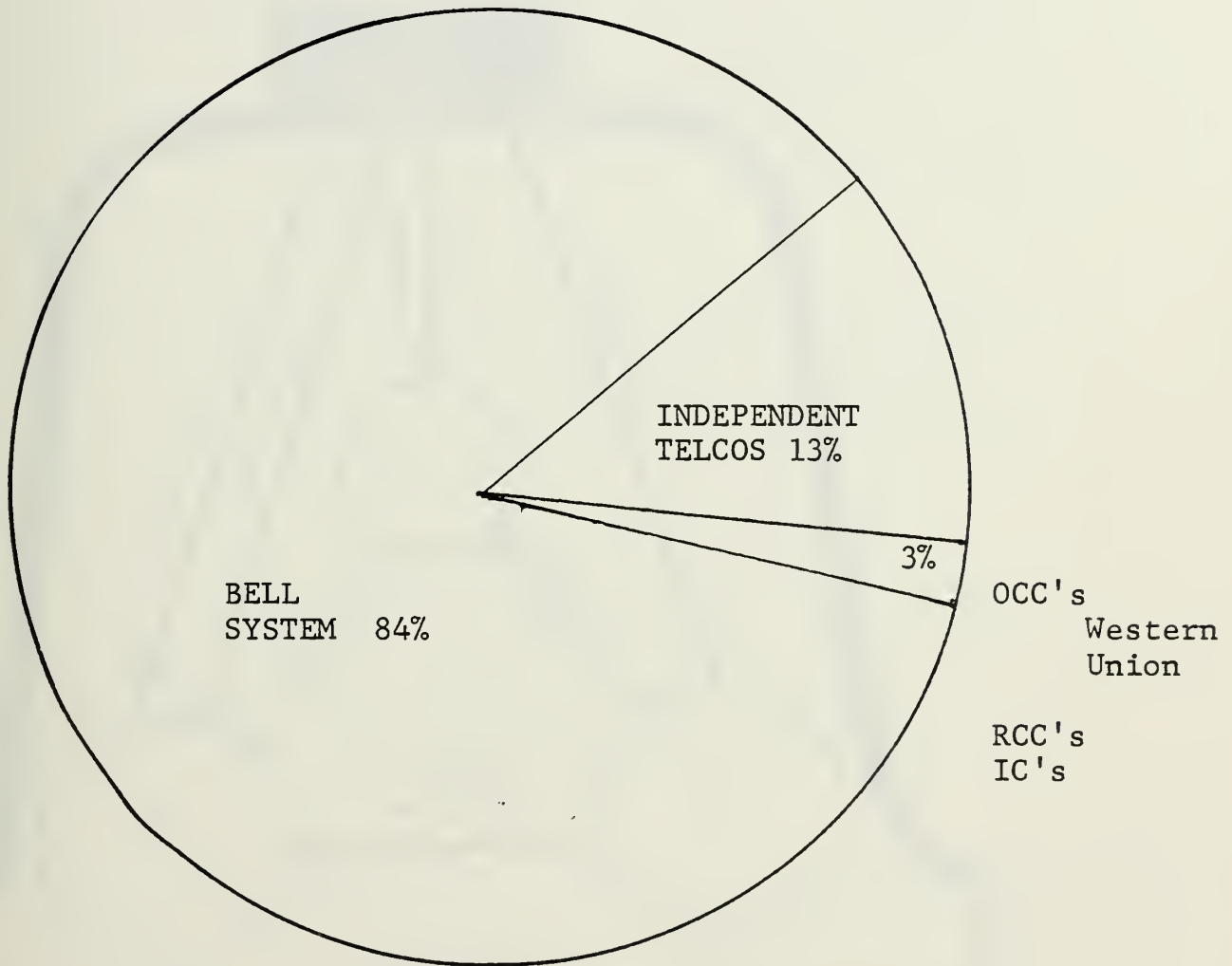
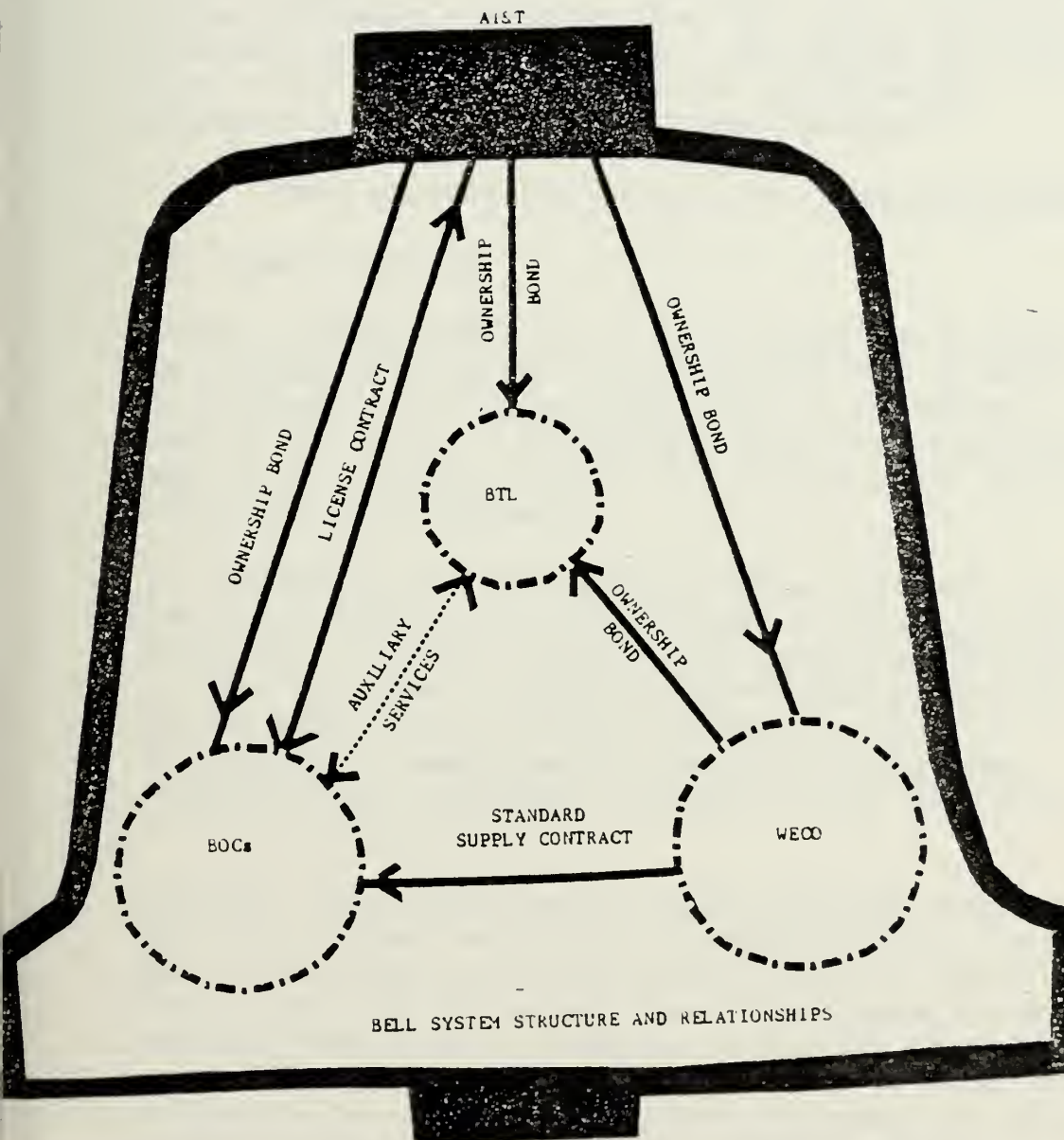


Figure 3-1

Note: Although only 1975 operating revenues are shown, the Bell System has "controlled" at least 84% of the total operating revenues for the last fifteen years.



- AT&T - Holding Company including Long Lines Department
- BOCs - 23 Bell Operating Companies
- BTL - Bell Telephone Laboratories
- WECC - Western Electric Company

Figure 3-2

The Long Lines Department which participates in rendering toll service in the U.S. is a part of AT&T. AT&T is the sole share holder of a manufacturing and supply affiliate, Western Electric; AT&T and Western Electric in turn own Bell Telephone Laboratories. The obvious point of this relationship is that AT&T is a holding company. It owns the supplier of communications equipment - Western Electric, Long Lines and the Bell Operating Companies. The prices and costs that occur among these corporate entities are essentially intra corporate transactions.⁷³

Irwin expands further on the interrelationships among these entities:

AT&T's relationship to its Bell Operating Companies is consummated through a License Contract in which Bell agrees to provide, inter alia, a management service in terms of financing, marketing, engineering advice, as well as access to the developments of Bell Telephone Laboratories.

The relationship between the manufacturer and the Operating Company is formalized by a Standard Supply Contract. In that Contract, the Operating Companies are not required to purchase from Western Electric. On the other hand, Western Electric assumes the obligation of supplying the Operating Telephone Companies with equipment, apparatus, and supplies at reasonable prices.

Together these entities and relationships, known as the Bell System, enable Bell Laboratories to conduct R&D and for WECO to manufacture products. The products are sold to the Bell Operating Companies which utilize them in the rendering of service to the subscribing public. Vertical integration of buyer and seller of the telecommunications equipment is congealed through holding company (AT&T) control.⁷⁴

In order to realize the magnitude of this vertical concentration, Western Electric, the Bell System's manufacturing subsidiary will be briefly examined.

- Western Electric Company (WECO), itself has a number of subsidiaries. They are:

- * Teletype Corporation (100%)
- * NASSAU Recycle (100%)
- * Manufacturer's Junction Railway Corp. (99.9%)
- * Sandia Corporation (100%)
- * Western Electric Company Limited (London) (100%)
- * Bell Telephone Laboratories (50%)

- Western Electric's total assets in 1975 were \$4.98 billion.

- In 1975 Western ranked 18th in sales and number 8 in employees among U.S. industrial corporations.

- Western Electric is the largest manufacturer of telecommunications equipment in the world.

- * 64-70 per cent of total U.S. telecommunications equipment market.

- * 90 per cent of the Bell Operating Companies equipment purchases.

- Western sales were nearly \$6.5 billion in 1975.

- * \$6.1 billion to BOC's.

- * \$300 million to the United States Government.

- * \$41 million to subsidiaries.

- * \$26 million to other customers.

Western Electric generally refuses to sell its product to non-Bell telephone companies as a matter of corporate policy.⁷⁵ In view of this policy of not competing for independent telephone business, the appropriate market for measuring concentration with regard to Western is the Bell System market. The Bell Operating Companies purchase over 90% of their equipment through Western Electric. This gives WECO a monopoly position in its relationship with the Bell Operating Companies.

The structural configuration of the Bell System presents serious economic as well as regulatory implications. For example:

- * how is the capacity and type of service offered by AT&T dependent on the type of equipment introduced by WECO?

- * how does vertical integration act to condition the Bell System responsiveness to demand shifts and adjustments to new technology?

- * are market opportunities in the industry foreclosed?

- * are there additional burdens of the regulatory process?

It is apparent that vertical integration is a predominant structural characteristic of the telephone sector.

C. PRODUCT DIFFERENTIATION

The second main element of industry structure is product differentiation. Bain states "...the degree of product differentiation refers to or measures the extent to which buyers differentiate, distinguish or have specific preferences among the competing output of various sellers in an industry."⁷⁶

Unlike the automobile or aircraft industry, product differentiation in the telecommunications industry has been, for the most part, non-existent. Prior to the mid 1960's the only service in which carriers competed for business was private line service (PLS) where AT&T and Western Union offered competing interstate lines for high volume communications uses. Other than this market, which comprises a very small aspect of the revenues realized by either, the domestic telecommunications industry was characterized as one where monopolists (the Bell System and Western Union) provided a limited number of homogeneous communications services.⁷⁷ This homogeneity also extended into the terminal equipment market. (Vertical concentration eliminated much of the product differentiation in the equipment market since Bell Operating Companies, GTE, United Telecommunications Inc., Continental Telephone Corp. purchased from their respective manufacturing affiliate.) The terminal

equipment market was also foreclosed by regulating policies which prohibited "foreign attachments" to telephone lines.

The revolution in computers and electronic technology during the late 1950's and early 1960's generated a multiplicity of specialized communication needs, particularly in two discrete areas - terminal equipment and private line service (PLS). This "technological revolution" coupled with several decisions by the Federal Communications Commission in the late 1960's "...has produced both a plethora of specialized requirements and a plethora of forms willing and capable of supplying those specialized needs."⁷⁸

The old concept of two black telephones linked by lines is no longer an accurate picture of the terminal equipment market or services needed today. The limitations of switched and private line telephone channels for data transmission was recognized by AT&T.

The telephone network was developed for speech transmission, and its characteristics were designed to fit that objective. Hence it is recognized that the use of it for a distinctly different purpose, such as data transmission, may impose compromises both in medium and in the specialized service contemplated.⁷⁹

In the terminal equipment market the question which the Federal Communications Commission faced was whether to rely on a few terminal equipment suppliers (the telephone companies, Bell in particular) or open the market for a variety of firms. In several key decisions the FCC "opened" the

market for free competition, much to the dismay of the telephone sector. Hundreds of different companies now build hundreds of different kinds of terminals.⁸⁰ There are now many specialized and innovative terminal devices available to satisfy customer demands. One supplier could not have met these heterogeneous communication equipment demands. Vertical integration permits the operating companies of the Bell and ITC's little choice; however the commercial and government consumers can now decide which equipment meets his needs and make cost quality trade-offs rather than entrusting those decisions to the telephone companies.

Approximately in the same time frame (late 1960's) the FCC recognized the need for expansion in the private line service and similar to the terminal equipment market, made several important decisions which authorized competition in the private line field. The reaction (conduct and performance) of the telephone sector, particularly the Bell System, to this "new competition" will be discussed in later chapters.

D. BARRIERS TO ENTRY

Barriers to entry are the advantages sellers have over potential competitors, i.e. the disadvantages that new firms face if they try to compete in an industry. In the telecommunications industry the barriers to entry have included

economies of scales, patents, absolute costs, produce differentiation, and of course regulation which will be discussed separately.

1. Economies of Scale

Economies of scale has been the "classic argument" which the telephone sector has used to defend its position as a "natural monopolist" in the telecommunications industry.

(Note:

One of the most unfortunate phrases ever introduced into law or economics was the phrase 'natural monopoly.' Every monopoly is a product of public policy. No present monopoly, public or private, can be traced back through history in a pure form ... 'Natural monopolies' in fact originated in response to a belief that some goal or goals of public policy would be advanced by encouraging or permitting a monopoly to be formed, and discouraging or forbidding future competition with this monopoly.)⁸¹

A firm's short-run costs of production are classified as fixed costs or costs that could be incurred if nothing were produced by the firm, and variable costs or costs that vary with the quantity of goods and services produced. Figure 3-3 depicts the typical pattern of a firm's fixed and variable costs. For a given size plant, fixed cost is constant over the range of possible output quantity. Variable costs change with increasing levels of output, but increase at a decreasing rate at low quantities, levels off and then increases at an increasing rate. (Improvements in technology

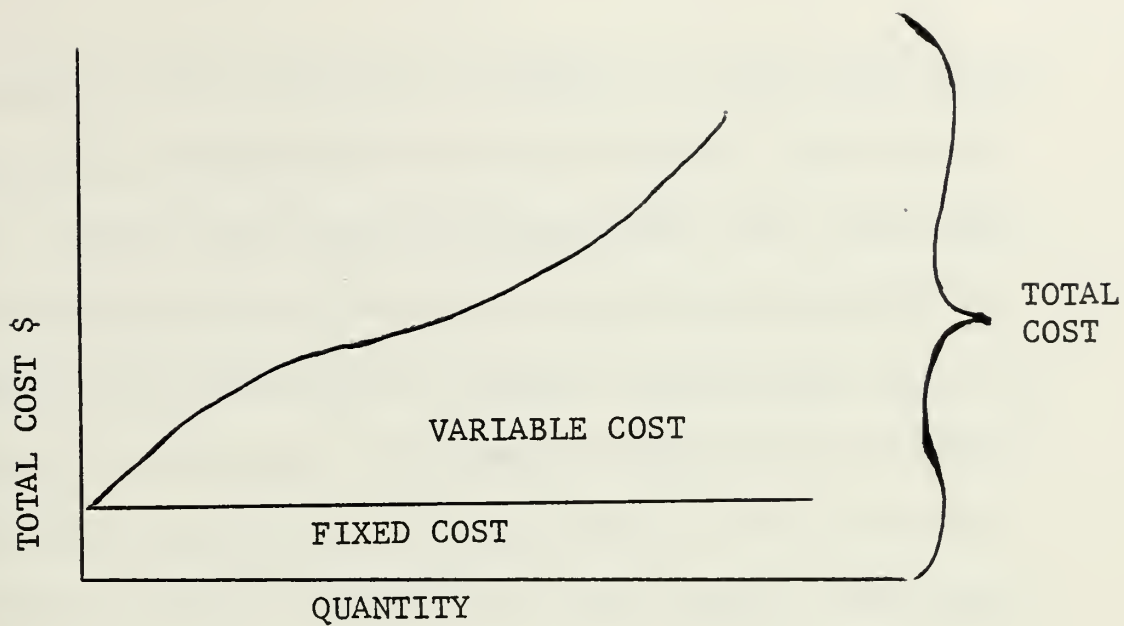


Figure 3-3

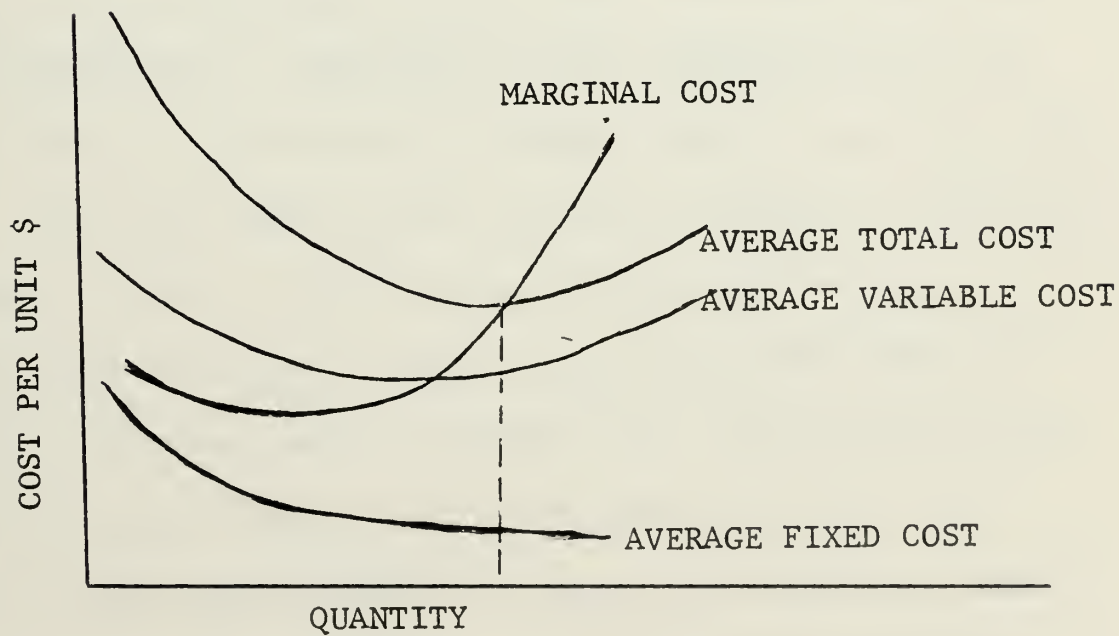


Figure 3-4

contribute to this behavior.) Figure 3-4 shows the corresponding cost components per unit of goods or services produced. At very low levels of production, labor and other variable inputs are operating at less than maximum efficiency so that the average variable cost per unit initially declines as production increases; marginal cost, the additional cost incurred with the production of one more unit of output, is also declining over this range. The firm's fixed cost declines over the entire range of possible production, and average total cost (average variable cost plus average fixed cost) declines until it reaches the minimum point or most efficient level of output for this scale of plant. (This is a common characteristic of many industries.) Beyond the most efficient output level, variable inputs are not so productive. The average total cost associated with higher levels of production is higher than the previous level.

Over the long run, all costs are variable. New capacity can be added. The addition of new capacity or a larger scale of operation, may result in a lower cost for the most efficient level of output, i.e., increasing returns to scales (Note: the most efficient level of output, in studies concerning economies of scales, is subject to numerous interpretations and controversy.), the same cost for the most efficient level of output (constant returns to scale)

or a higher average cost for the most efficient level of output (decreasing returns to scale). Over the long run, firms in most industries experience a family of average cost curves with cost higher over very small sizes of plant, leveling off over a range of sizes of plant and eventually increasing as in Figure 3-5. Figure 3-5 depicts the above in three phases, with the minimum optimal scale occurring between increasing returns to scale and constant returns to scale.

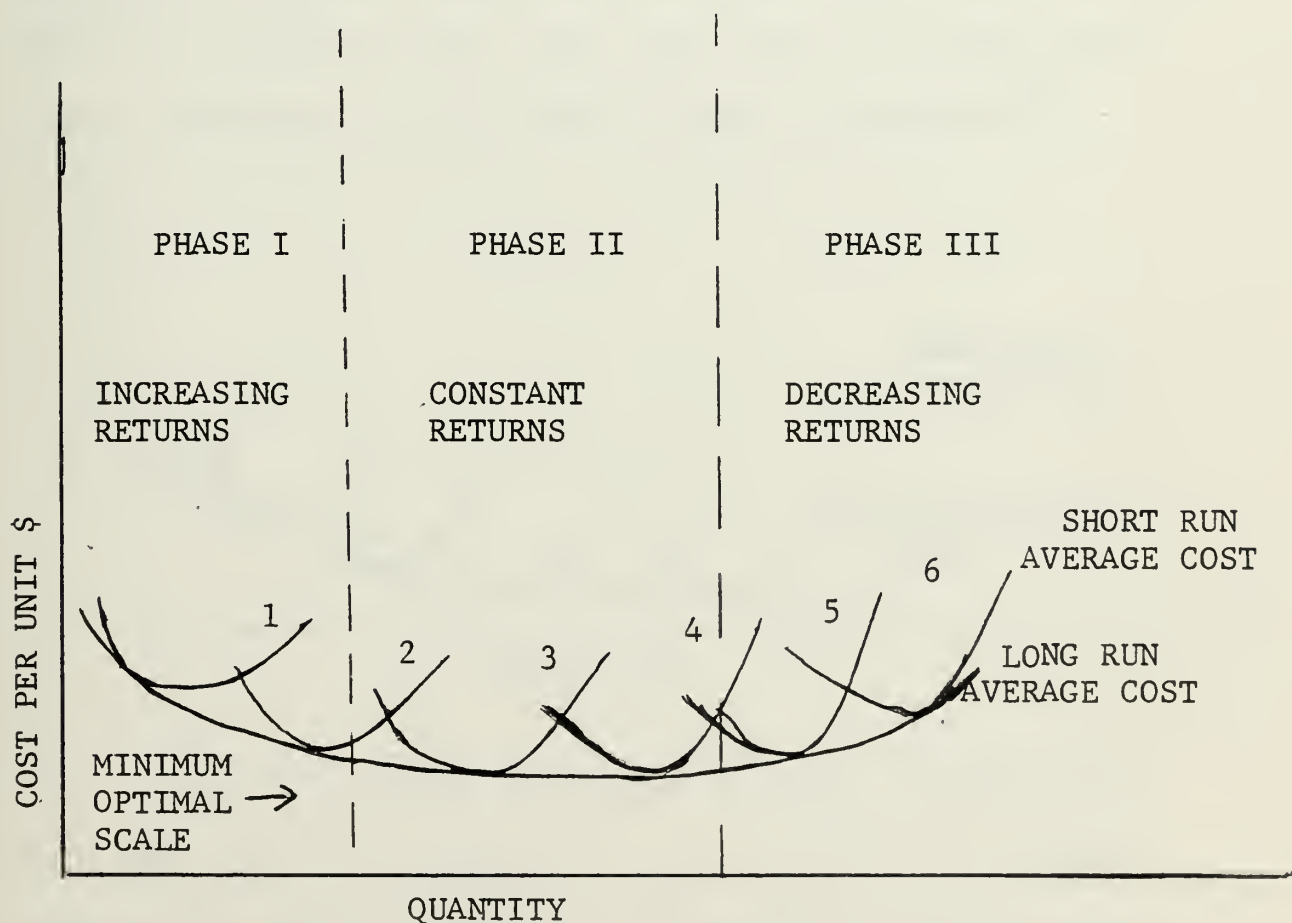


Figure 3-5

In part, economies of scale determine the market structure of an industry. If the minimum optimal scale is large relative to the demand for an industry's output, the industry will have fewer firms than the case where the minimum optimal scale is small. If returns to scale increase over all ranges of output, up to the size of the market, then a "natural monopoly" or only one firm will exist; the firm's family of short-run average cost curves and long-run average cost curves appears as in Figure 3-6. Note that the short-run minimum average cost, the point of optimal efficiency, decreases as the scale of plant increases.⁸²

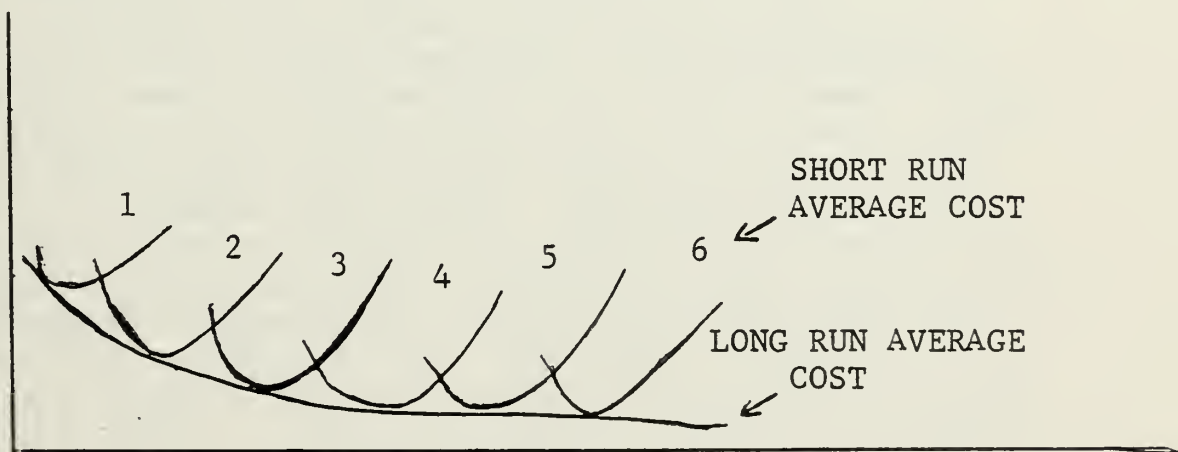


Figure 3-6

The Bell System as well as the ITC's contend that this last type of economies of scale exists; i.e., a non-competitive market situation is determined by economies of scale. Empirical evidence does not substantiate this argument; in fact, the FCC has done extensive studies in two

areas -- the interconnect and private line service market -- and concluded that no large economies of scales actually exists. (For example, see FCC Docket 20003.) However, an extremely important fact is that this economies of scale is a static concept; a given technology at a given point of time is assumed.

Technological progress, a dynamic process, may alter the optimal industry structure and change economies of scale dramatically. John H. Landon addresses this very important phenomenon below.

(Figure 3-7) ...demonstrates the potential impact of changing technology, and changing knowledge of existing technology, on optimal industry structure... Panel (a) illustrates the original equilibrium position. Here the firm is quite correctly a natural monopolist... the firm sees the falling costs over all relevant ranges of output. In a purely static and certain world, the firm would commit all of its resources to the construction of a single large plant. Additional firms would have no incentive to enter the industry since entry at a smaller scale involves a substantial cost disadvantage. Government regulation may result from the market concentration enforced by this technology. Panels (b) and (c) represent alternative possible situations in a subsequent period. Panel (b) depicts a new ATC curve which has evolved through technological change and results in costs more nearly horizontal. There are in fact, substantial diseconomies within the relevant range of outputs... Entry is no longer precluded by the nature of the technology and price will tend toward ATC unless there are institutional barriers... Panel (c)^{t+1} shows the original ATC_t curve extended into regions of output that were not explored in the initial period. A shift in demand to the right to D' resulted in a scaling up of production revealing the dotted rising cost segment... Further growth of industry sales will certainly cause a division of the market among a number of plants whether or not they are operated by the same firm.

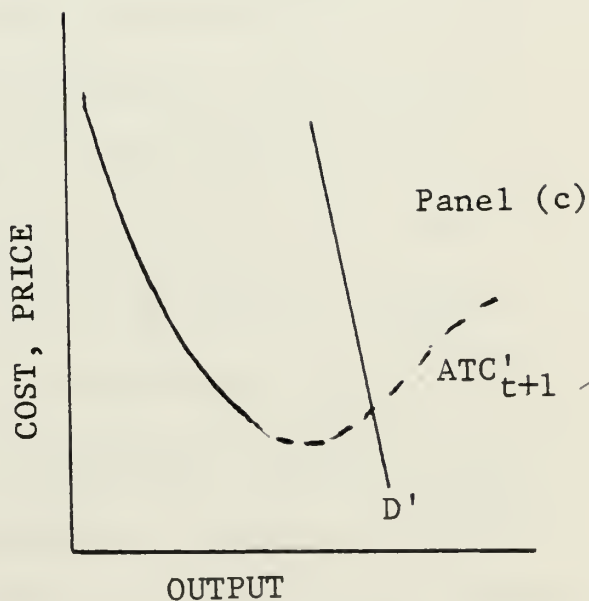
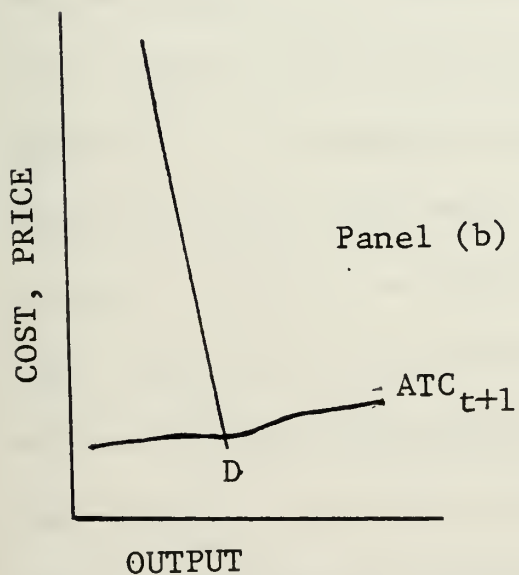
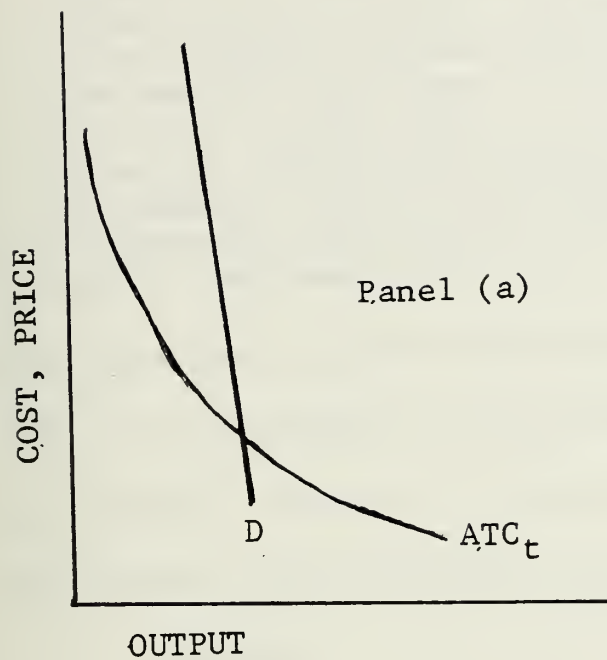


Figure 3-7
Natural Monopoly at the Plant Level

(Source: "Changing Technology and Optimal Industrial Structure")

Scenarios (b) and (c) both change drastically the optimum scale of plant, the equilibrium structure of the industry and the proper degree and kind of governmental involvement in functioning of the industry... in both cases, moved from a natural monopoly situation calling for concentration of output and governmental regulation of price to a potentially more competitive market calling for less, if any, governmental involvement.⁸³

The important question to be asked is: Which panel, (a), (b) or (c) represents the telecommunications industry accurately? Aspects of this question will be explored in the conduct and performance chapters.

2. Patents

Patents create a 17-year barrier to entry for a company which does not have the capital to develop an alternative design to an existing patent and will not or cannot pay a royalty fee to the patent holder for non-exclusive rights.⁸⁴ If a company decides to pay royalty fees, it raises its cost curve which increases the absolute cost barrier to entry. As pointed out in an earlier section: "Bell used the patent monopoly to establish itself in the most lucrative urban markets, to develop a sound corporate and financial structure and generally to secure a competitively advantageous position."⁸⁵ In the 1956 consent decree, AT&T retained Western Electric in exchange for opening its patent portfolio on a royalty-free basis; these patents proved to be a commanding asset.⁸⁶ With competition emerging

within the telecommunications industry, patents may, in the future, become significant barriers to entry.

3. Absolute Cost

Absolute cost barriers to entry are those factors "...which make the production cost curve of a new firm lie above that of a going concern."⁸⁷ This is true for the telecommunications industry as well as any other industry, the difference being that in a "vertically integrated" industry such as telecommunications, the spread between curves is greater. Figure 3-8 shows the new firm's average cost curve placed above the old firm's by a fixed amount. In this case the new firm faces a cost disadvantage over the old one at any output level it chooses to produce.

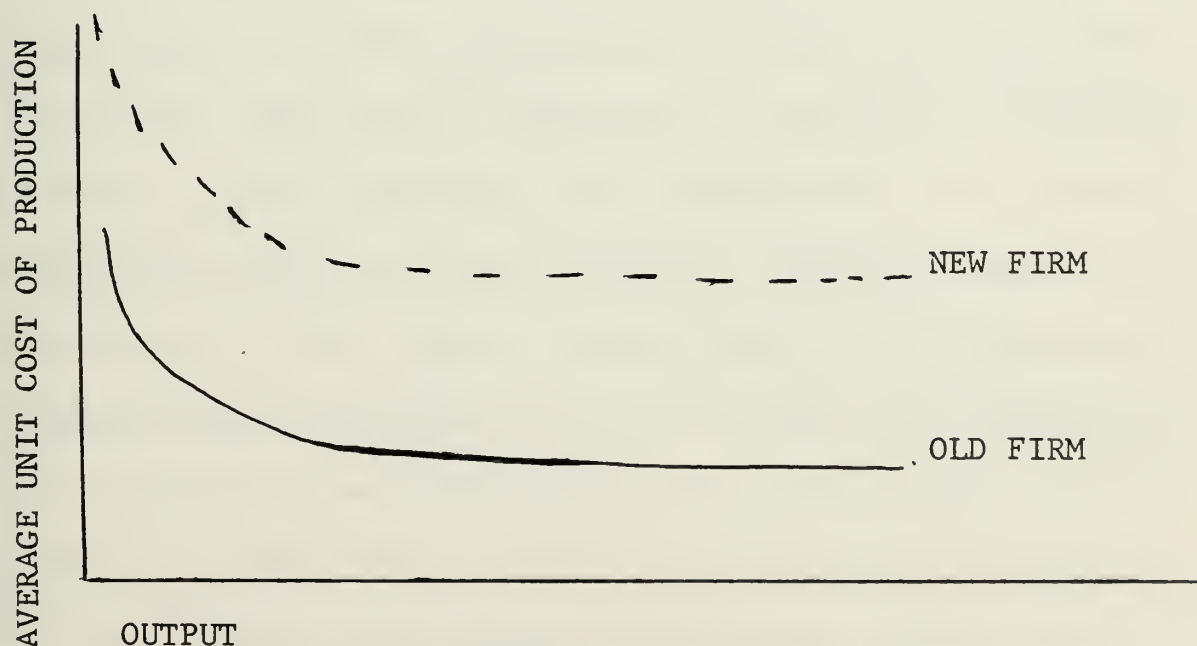


Figure 3-8

Absolute cost barriers include: technological innovation that the new firm does not have and must pay for, i.e. patent rights to obtain valuable "know-how;" a supply of significant input raw material which may be of limited supply; and the cost of capital to a new firm. Capital requirements become significant in the telecommunications industry, especially if the lending institutions consider the entry of a new firm a high risk, or large sums of money are required (this is true of domestic satellite ventures). The absolute cost barrier is a major barrier to entry for potential telecommunications companies.

4. Product Differentiation

Product differentiation barriers to entry are also significant. The Bell System has a "name" established with the public. Most people associate its name with outstanding service, quality equipment, etc. Traditionally its advertising and sales promotion have been a minimum compared to percentage of total sales. The new firm in the telecommunications market may have to sell at a lower price which means he will have to keep advertising costs at a minimum or if he charges the same price, he may spend more on advertising to sell his product than the Bell System does. Figure 3-9 depicts the new entrants dilemma.

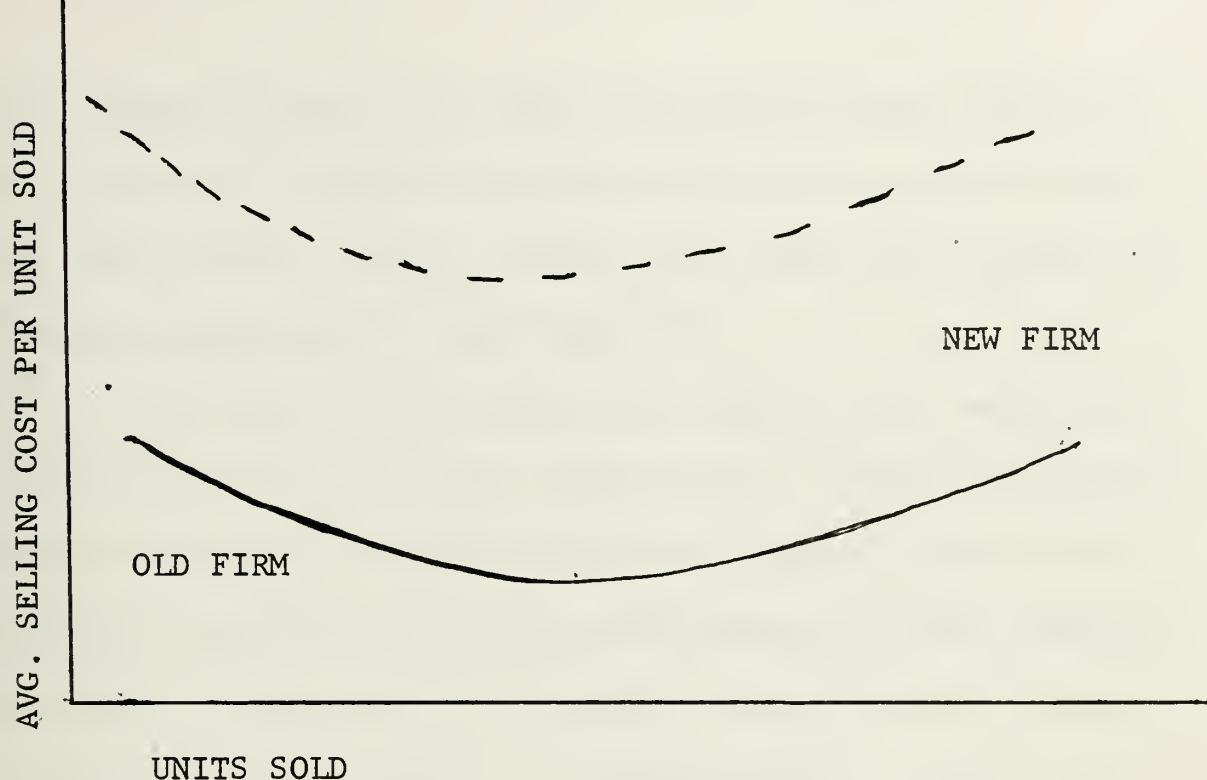


Figure 3-9

The effect of product differentiation barriers is similar to that of absolute costs barriers. Competition in several markets of the telecommunications industry (interconnect and private line service) make product differentiation another potential barrier to entry.

5. Regulation

The telecommunications industry is a regulated industry. Unlike most industrialized countries which have nationalized their communications, the United States has relied on private ownership, controlled by state and federal regulatory commissions. The combination of private ownership and public control directly shapes and conditions the structure of the telecommunications industry. Regulation is a legal as well

as economic concept, i.e. the telecommunications industry is economically motivated as are other private enterprises, yet they render a public service and, hence, are subject to detailed governmental regulation.⁸⁸

The tasks which regulatory agencies are required to perform are not often easy. They are "...called on to intervene in the economic process when the market grossly fails to elicit acceptable economic performance by some criterion or other ... They must try to make the performance of the regulated sector conform to those standards, without completely controlling the regulated organizations"⁸⁹

The regulatory commission's task in the telecommunications industry is even more complex because of selected competition within the regulated sector and on its perimeter; ambiguous conditions and divided responsibility usually result.

Public Utility Commissions (state regulatory agencies) have authority over rate-making for all intrastate services, including basic exchange, intrastate toll and terminal equipment. The Federal Communications Commission has exclusive jurisdiction over interstate service and terminal equipment which affects the national communications network.⁹⁰ The effects of regulation on structure are apparent: the high concentration in the industry -- historically regulatory

agencies felt competition in the telecommunications industry was wasteful, costly and inefficient; lack of product differentiation influenced, in part, by the no "foreign attachment" or "duplication" of services rulings by regulatory boards. Barriers to entry in both an economic and legal sense have been heightened due to regulation. The effects of regulation in these structural elements will be apparent in the conduct and performance of the telecommunications industry, particularly the telephone sector.

E. THE OTHER SECTORS

Throughout this chapter, the telephone sector has received most of the attention. Let us now briefly review the remaining 3 per cent of the telecommunications industry. With the exception of the telegraph sector, the interconnect companies (IC's), RCC's, and OCC's are experiencing tremendous growth. The services and equipment which these sectors represent threaten the "monopoly" position which the telephone sector has long enjoyed. Spurred by recent favorable decisions by regulatory agencies and also increased technological progress, significant inroads, though small in overall dollar amounts, are being made in the industry. It is in these sectors, where competition is flourishing and growing, that the direction of the industry will be determined.

1. The Interconnect Sector

Today, the interconnect sector of the telecommunications industry is made up of many firms which provide a variety of terminal equipment to the telecommunications industry. A few examples of the wide variety of terminal equipment supplied are listed below:

- Alpha-numeric display terminals
- Facsimile equipment
- Data terminals and computers
- Word processing systems
- Ancillary devices (i.e. alarms, automatic dialers)
- Medical telemetry equipment
- Environmental monitoring sensors

Although there are now many firms in the sector, the telephone sector, i.e., Western Electric, still is the principal supplier of interconnect equipment. The best estimates that can be made on the size of the sector by the FCC (at the present time there is no "industry-wide" trade association which provides data on the make-up of this sector) is contained in the following tabulation:

Estimated PBX and KTS Revenue, 1975
(millions of dollars)

Telephone sector	3,060
Interconnect sector	<u>143</u>
Total	3,203

Estimated revenues from private branch exchanges (PBX's) and key telephone systems (KTS's), the two major products of the interconnect market, are shown because revenue data for other products are not available for the total market. These other products, however, such as modems, repertory dialers, and answering machines, are estimated (by the FCC) to account for a relatively small part of the industry in terms of revenues. Additionally, historical revenue data for terminal equipment is available only for the Bell System. Since Bell accounts for the bulk of the revenues, however, it is significant to show this data. In 1960 Bell revenues from terminal equipment were \$869 million; in 1965, \$1.3 billion; and in 1970, \$2.1 billion. It should be noted that in 1960 and 1965 no revenues were generated by the interconnect industry, since this was the pre-Carterfone period; in 1970, revenues from the interconnect market were probably less than \$10 million.⁹¹

The non-telephone companies accounted for only 4.46 per cent of total revenues from PBX and KTS, and less than one-half of 1 per cent of the total revenues of the telecommunications industry in 1975.⁹²

2. Other Common Carriers

The other common carriers comprise the following groups:

- specialized common carriers (SCC's)
- value added networks (VAN's)
- domestic satellite carriers (DSC's)

These OCC's provide voice, facsimile, data and other applications in public and private networks to the commercial and government sectors. Figure 3-10 shows the geographical location OCC's served in 1975. Like the terminal equipment

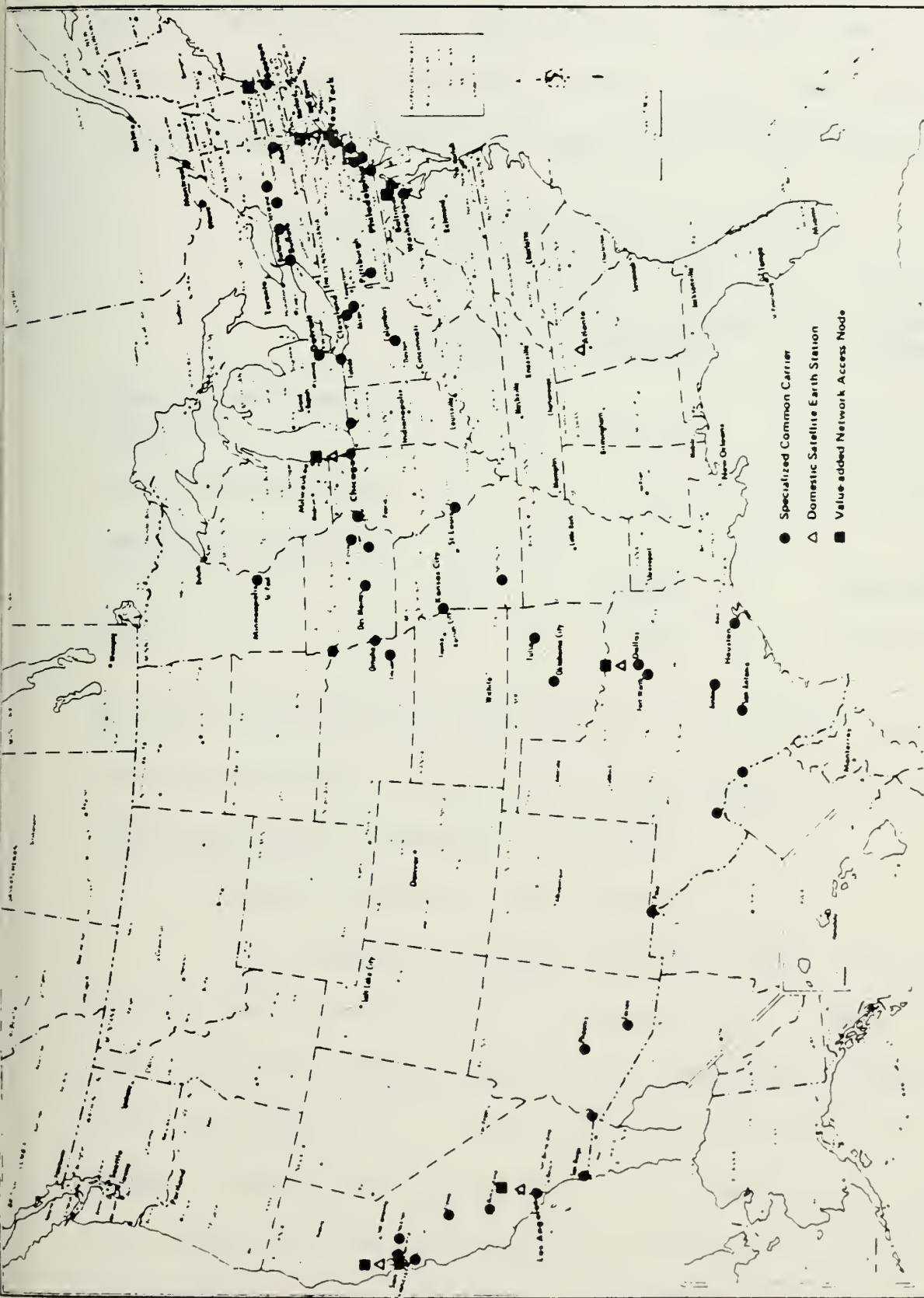


Figure 3-10

market, there were no revenues prior to 1969. The following tabulation shows the number of OCC's firms, their operating revenue and their amount of gross plant at the end of 1975.⁹³

Operating Revenues and Gross Plant
(in Thousands of Dollars)

	<u>No. of Firms</u>	<u>Operating Revenue</u>	<u>Gross Plant</u>
Specialized common carriers	9	34,944	166,611
Value added carriers	2	20	3,020
Domestic satellite carriers	<u>3</u>	<u>16,300</u>	<u>205,000</u>
Total	14	51,264	374,631

The OCC's accounted for about 0.1 per cent of the operating revenues and about 0.3 per cent of total gross plant of the telecommunications industry in 1975.⁹⁴

Briefly looking at each group of OCC's:

(a) Specialized common carriers (SCC's) consisted of nine operational firms at the end of 1975. Table 3-4 shows the gross communications plant, operating revenues and net income from SCC's. Except for Data Transmission Co. (DATRAN) which filed for a petition of bankruptcy in August 1976, these SCC's are point-to-point microwave carriers. They compete against the common carriers by offering a wide choice of bandwidths and channel conditioning options.

Table 3-4

SPECIALIZED COMMON CARRIERS 1/
December 31, 1975

(In Thousands of \$)

	<u>Gross Communi- cations Plant</u>	<u>Operating Revenues</u>	<u>Net Income From Microwave Services</u>
CPI Microwave, Inc.	10,910	1,876	(758)
Data Transmission Co.	48,733	117	(15,374)
MCI Telecommunications Corp. <u>2/</u>	<u>3/</u>	21,319	(24,405)
Microwave Communica- tions, Inc. <u>2/</u>	4,727	1,643	(1,468)
Midwestern Relay Co. <u>4/</u>	10,307	2,377	129
N-Triple-C, Inc. <u>2/</u>	11,871	548	(2,401)
Southern Pacific Communications Co.	71,781	5,088	(14,796)
West Texas Microwave Co. <u>4/</u>	2,587	871	302
Western Telecommuni- cations, Inc. <u>4/</u>	5,695	1,105	265
Total	166,611	34,944	(58,506)

*() indicates loss

1/ Source: F.C.C. Form P, 1975

2/ Parent company is MCI Communications Corp.

3/ Leases all communications plant from MCI Leasing Corp.

4/ Operates as both a Specialized Common Carrier and a Miscellaneous Microwave Common Carrier.

Table 3-5 shows the operating revenues of the SCC's compared with the private line operating revenues generated by the Bell System and the ITC's.⁹⁵ As mentioned previously, the SCC's only recently began generating revenues; in 1975 they only accounted for 2.12 per cent of the total private line revenues.

(b) Value Added Network (VAN's) consist of only two companies, Telenet and Graphnet. The VAN's are attempting to serve a market where the user is seeking additional service -- the added value -- to be superimposed by the carrier upon the basic transmission service.⁹⁶

(c) Domestic Satellite Carriers (DSC's) consist of five firms:

- Western Union Telegraph Co. (WESTAR System)
- RCA American Communications Inc. (SATCOM System)
- American Satellite Corporation (ASC)
- AT&T/GT&E System
- Satellite Business System (SBS)

RCA began operations in late 1973 and WESTAR and ASC in late 1974. AT&T/GT&E began service in late 1976 and SMS is still in the development phase.

3. Domestic Telegraph

Western Union is the single carrier of message telegraph service in the United States. It also offers mailgrams,

Table 3-5

Operating Revenues: Telephone Company
Private Line* and Specialized Common Carriers

(In Thousands of \$)

	<u>1960</u>	<u>1965</u>	<u>1970</u>	<u>1975</u>
Bell System <u>1/</u>	\$403,862	\$543,766	\$1,030,857	\$1,479,473
Independent Telephone Companies <u>2/</u>	<u>14,872</u>	<u>36,782</u>	<u>80,439</u>	<u>133,103</u>
Total Telephone Companies	418,734	580,548	1,111,296	1,612,576
Specialized Common Carriers <u>3/</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>34,944</u>
Total	<u>\$418,734</u>	<u>\$580,548</u>	<u>\$1,111,296</u>	<u>\$1,647,520</u>

* including intrastate private line.

1/ Statistics of Communications Common Carriers, 1960, 1965, 1970, 1975.

2/ Independent Telephone Company Statistics, 1960, 1965, 1970, 1975.

3/ FCC Form P, 1975.

TELEX/TWX, and private line service (PLS) including satellite service (WESTAR System). Western Union's public message (telegram) service has continued to decline for many years; however, its operating revenue and gross plant continues to grow as it expands into the private line service/satellite communications service.

4. Public Land Mobile Radio Service

Public Land Mobile Radio Service is provided by the telephone companies and other Radio Common Carriers (RCC's). The companies provide mobile radio/telephone service, paging service and air/land service. Due to its small size, this sector has almost no impact on the industry.

F. SUMMARY

A basic overview and description of the structure of the domestic telecommunications industry, with emphasis on the telephone companies (particularly the Bell System), has been presented. The telephone sector and particularly the Bell System dominate the telecommunications industry. They have a monopoly on all local and toll telephone service in the country and they also provide the majority of all other telecommunications services in the United States. The telephone sector accounted for 97 per cent of the operating revenues and total communications plant in 1975; the combined

operating revenues of the OCC's, interconnect, RCC's and telegraph sectors, was only 0.5 per cent of the operating revenues in the industry.

The telecommunications industry is highly concentrated in the telephone sector which in turn is also highly concentrated among the Bell System and the three major independents. (They account for 95 per cent of the market, as measured by number of phones.) Vertical integration or "vertical concentration" within these companies, enable them to assume extreme market power; vertical concentration also raises entry barriers by "foreclosing" parts of the market. Until recently product differentiation has not played a significant part and now only in a small portion of the telecommunications market. Barriers to entry in some areas are formidable (satellites), in other areas relatively low (terminal equipment and private line service). Lastly, regulation continues to be an important influencing force in the industry. Competition is emerging in various peripheral areas and is playing an increasingly large role in determining the industry structure.

IV. CONDUCT OF THE UNITED STATES TELECOMMUNICATIONS INDUSTRY

A. INTRODUCTION

Richard Caves has stated in his book American Industry: Structure, Conduct, and Performance, that market conduct involves a firm's policies toward setting prices; its policies toward setting the quality of its product; and its policies aimed at coercing rivals.⁹⁷ The conduct of the domestic telecommunications industry concerns the aggregate of acts, practices, and policies committed or employed in arriving at its decisions of courses of action to take. Obviously the structure of the industry has a direct influence on the conduct of the firms constituting the industry and this influence can be seen in the behavior which the firms exhibit in the telecommunications markets. This chapter will consider the principal constituents of market conduct, as mentioned by Caves, and will attempt to illustrate the interplay of the major participants in the markets. In the research for this thesis, the authors have discovered the difficulty in pinpointing specific causes for certain actions taken by a company. Unlike the free market, the telecommunications industry is heavily regulated and the interplay of political, legal and economic elements sometimes

creates a maze of the justification or rationale for actions undertaken by firms or dictated by the government. As best as possible, the authors have attempted to identify root causes and attribute them to the correct market stimuli.

1. Telecommunications Market Players

As noted in the history of the telecommunications industry and in the concentration figures of Chapter Three, market imperfection is characteristic of the industry. The role of government at all levels cannot be dismissed in the evolution and formulation of the telecommunications industry existing today. In fact, it is proper to consider the regulatory bodies as active players in market conduct as illustrated in Figure 4-1. This has especially been the case in the post-"Above 890"/Carterfone/MCI era, from 1960 to the present, as we shall see later in this chapter. Figure 4-1 shows by elementary set theory the interplay of the players who are listed in Table 4-1. However by no means should this be assumed to exhaust all of the possible scenarios for interaction. It is shown to present a simple visual picture of the groups of companies, people, and regulatory bodies shaping the conduct of the U.S. telecommunications markets.

REGULATORY/QUASI-REGULATORY
BODIES

CONGRESS
FCC
STATE PSC
OTP
DEPARTMENT OF JUSTICE
NARUC

USERS

BUSINESS
RESIDENTIAL
GOVERNMENT

WESTERN UNION

ITC'S
SSC'S
VAN'S
DSC'S
RCC'S

SUPPLIERS OF
TELECOMMUNICATIONS
SERVICES
(DIRECTLY
REGULATED)

INTERCONNECT
COMPANIES

IC'S
ITC SUBSIDIARIES

AT&T

WESTERN ELECTRIC

AT&T'S VERTICAL
SUPPLIER RELATIONSHIP
(INDIRECTLY REGULATED)

COMPUTER
INDUSTRY

NUMEROUS FIRMS

Figure 4-1
Existing U.S. Telecommunications Industry Market Players

Table 4-1

Existing U.S. Telecommunications Industry Market Players

REGULATORY/QUASI-REGULATORY BODIES

CONGRESS	Legislative Branch of Government
FCC	Federal Communications Commission
STATE PSC	Public Service Commissions of the 50 States (Responsible for Utility Regulation within State Boundaries)
OTP	Office of Telecommunications Policy
DEPARTMENT OF JUSTICE	Government Department Responsible for Antitrust Violations
NARUC	National Association of Regulatory Utility Commissioners (The National Lobby for State PSC's)

SUPPLIERS OF TELECOMMUNICATIONS SERVICES

WESTERN UNION	Single Domestic Telegraph Common Carrier
ITC's/USITA	Independent Telephone Companies; Represented by the National Body - the U.S. Independent Telephone Association
SCC's	Specialized Common Carriers
VAN's	Value Added Networks or Carriers
DSC's	Domestic Satellite Carriers
RCC's	Public Land Mobile Radio Common Carriers
AT&T	American Telephone and Telegraph Company

AT&T'S VERTICAL SUPPLIER RELATIONSHIP

WESTERN ELECTRIC

Wholly-owned Manufacturing Subsidiary of AT&T. Can be classified as an IC

USERS

BUSINESS

RESIDENTIAL

GOVERNMENT

INTERCONNECT COMPANIES

IC'S

Interconnect Companies; Manufacture Terminal Equipment. Unregulated by the FCC but equipment must be certified and registered with the FCC if used for interstate purposes.

ITC SUBSIDIARIES

Manufacturing Subsidiaries of ITC's. Relatively small when compared to Western Electric

COMPUTER INDUSTRY

NUMEROUS FIRMS

Shown to illustrate the narrowing distinction between data processing and data communications

2. Telecommunications Versus Teleprocessing

Of interest to note is the depiction of the computer industry in the field of telecommunications players. To explain the reasoning behind this portrayal is worthwhile.

A teleprocessing system and a telecommunications system differ mainly in their most important parameter, their output - what they are supposed to deliver to their users. The output of the teleprocessing system is simply a data processing service, which can also be defined as a data manipulation activity. In a telecommunications system the objective is to transfer, rather than manipulate, the data.⁹⁸

However fine a demarcation line the above definition provides, it is still not enough because confusion continues to exist. For instance, in teleprocessing schemes, telecommunications exists when the remote user must get the data to the CPU before computation occurs. Or in a number of telecommunications systems, data must be manipulated to a degree before it can be transferred, i.e., in a message switching arrangement where the switches are minicomputers with store and forward capabilities. Thus telecommunications systems involve teleprocessing and vice versa in an ever increasing number of "data communications" systems.

These problems were the basis for the first FCC Computer Inquiry from 1966 to 1970 which declared that communications common carriers could not offer data processing services except through a separate subsidiary (to prevent

cross-subsidization of competitive data processing services with regulated telecommunications activities).⁹⁹ Recognition of data processing functions incidental to message switching was formalized but the FCC has recently announced a new Computer Inquiry¹⁰⁰ due to the fact that "technological advances in computer hardware and software are blurring the distinction between data processing and communications, and make new definitions appropriate."¹⁰¹ The important point is that data processing can no longer be treated in isolation from telecommunications; the depiction of the Computer Industry as a player in the telecommunications markets underscores this fact and it is advisable to consider the potential impact of competitive computer firms as players in the telecommunications markets of the future.

B. TELECOMMUNICATIONS SERVICES/PRODUCT QUALITY AND MARKET COMPETITION

The product of the telecommunications industry is telecommunications services. Specifically people are interested in the ability to send a message to a particular place at a particular time. In the purest sense message content should be of no concern to the transmission of the message, but as mentioned previously in the introduction to this chapter, due to considerations of significant message volume, efficiency, and speed, the use of ancillary data processing

equipment is recognized as part of many telecommunications services where the meaning of the message remains unaltered.

The market for telecommunications services is itself a point of discussion. Is the telecommunications industry one market with multiple and varied services or is it several markets each with a distinctive service of its own? Although AT&T's Chairman, John deButts, argues that the telecommunications industry is one market and that "what happens anywhere in that market inevitably produces repercussions elsewhere in that market,"¹⁰² the FCC argues otherwise, maintaining the existence of a local exchange market; a long distance telephone market; a private line service (PLS) market; a terminal equipment market; a public switched teletypewriter market; and a public land mobile radio service market. In this characterization of the industry, the local exchange and long distance telephone markets operate under monopoly franchises while the public switched teletypewriter market is monopolistic, with the remaining three markets being competitively nurtured by the FCC, especially in the post-"Above 890"/Carterfone/MCI era. Based on the research done for the thesis, the authors subscribe to the FCC view of multiple markets within the industry, each with distinctive services; however it should be pointed out that in many instances, even in FCC documents, the substitution of

"market" and "industry" is common and often without adequate rationale.¹⁰³

An important caveat is necessary before beginning the discussion of telecommunications services. The tariffed offerings of the established common carriers, the SCC's, the RCC's, the VAN's, and DSC's, usually indicate various conditions of the offered service, i.e., whether it is to be a public or private tariff offering as indicated in the introductory chapter, or whether the offering will be interstate or intrastate only. These additional delineations in the types of telecommunications services offered, when considered with the multitude of suppliers of telecommunications services and the varied users, illustrate the many different possibilities of distinctive and unique services potentially available. However, given the many services now available in telecommunications markets (differentiated by such factors as the type of user, the specific supplier, and whether the service is public or private, interstate or intrastate), a degree of market substitutability exists, especially in the PLS and terminal equipment markets. Dependent upon whether the services are voice, record, or data, the offerings of PLS by the common carriers and the equipment manufactured by the IC's have become more common, with choice

increasingly measured by cost, product quality, or product differentiation.

Emphasis in this section will primarily concern the PLS and terminal equipment markets. Since the competitive spurs given to these two markets commencing in the 1960's by the FCC, there has been a continuing debate within the telecommunications industry over whether the "Above 890," Carterfone and MCI decisions have improved the quality of telecommunications services and opened new markets of service due to technological and managerial innovation. In the following discussion of telecommunications services and product quality, these questions will be highlighted.

1. Pre-"Above 890"/Carterfone/MCI

As explained in Chapters Two and Three, the established common carriers have maintained a virtual stranglehold on the telecommunications markets enumerated above. The only exception to this, prior to the 1960's, has been the public land mobile radio service market where numerous firms have existed since soon after the markets' inception. The RCC's relatively minor operating revenues and total communications plant indicate its still small state as a market of telecommunications service and for that reason discussion of RCC's will be minimal.¹⁰⁴ During the pre-"Above 890"/Carterfone/MCI period, the examples of

telecommunications services and selected tariffs offered by the established common carriers and the established terminal equipment manufacturers (Western Electric and ITC subsidiaries) can be seen in Figure 4-2. Terms are explained in Table 4-2.

Prior to 1960, the PLS and terminal equipment (interconnect) markets were primarily the domain of the telephone companies and Western Union, and Western Electric respectively. Demand for PLS other than those services indicated in Figure 4-2 was not great; microwave technology did not arrive until 1946 and its use in PLS did not increase until the "Above 890" decision of 1959 and finally the MCI Specialized Common Carrier ruling of 1969. Prohibitions by AT&T on interconnection and the "cemented" relationship of Western Electric as the manufacturing subsidiary of AT&T were barriers which effectively closed the interconnect market to other firms, with the previously noted exception of the small manufacturing subsidiaries of the ITC's. In sum, the PLS and terminal equipment markets were non-competitive.

Price competition among the established common carriers did not really exist in this period except for some limited competition in the PLS market between AT&T and Western Union where both common carriers offered competing interstate PLS lines for high volume communications users.

TELEPHONE COMPANIES		RCC'S	TELEGRAPH COMPANY	WESTERN ELECTRIC & ITC SUBSIDIARIES
SERVICES	AT&T			
PUBLIC	AT&T	ITC'S	WESTERN UNION	<u>TERMINAL EQUIPMENT</u> VERTICAL SERVICES
	<u>LOCAL EXCHANGE</u> LONG <u>DISTANCE</u> MTS	<u>PUBLIC LAND MOBILE RADIO SERVICE</u> (MOBILE RADIO TELEPHONE SERVICE, PAGING, RURAL RADIO, AIR/GROUND SERVICE)	<u>PUBLIC SWITCHED TELETYPEWRITER</u> PMS TELEX	
PRIVATE	<u>PLS</u> TWX FX CCSA	<u>PLS</u> FX CCSA	<u>PLS</u> (PRIVATE OFFERINGS SUITED TO INDIVIDUAL BUSINESSES)	TRANSMISSION & DISTRIBUTION EQUIPMENT <u>MARKETS UNDERLINED</u>
		*NOTE:	TELECOMMUNICATIONS	

Examples of Selected Telecommunications Services
 Pre-"Above 890"/Carterfone/MCI 105, 106, 107, 108, 109

Figure 4-2

Table 4-2

Glossary of Typical Services/Equipments
Offered in Telecommunications Markets

AUTODIN	Automatic Digital Network of DOD. A PLS provided by Western Union.
AUTOVON	Automatic Voice Network of DOD. A PLS provided by AT&T and ITC's.
CCSA	Common Control Switching Arrangement. Provides computerized control of private line networks. Equipment is located on the premises of the common carrier unlike PBX. Along with FX, CCSA accounts for over 40% of PLS offered by AT&T.
DATACOM	Western Union service for medium speed data transmission requirements.
DATASPEED 40	Data communications device offered by AT&T/Western Electric. IBM has charged that it is in fact a data processing device rather than a data communications device.
DDS/DUV	Dataphone Digital Service/Data Under Voice. An offering by AT&T of digital transmission services which makes use of the lower portion of the microwave spectrum of Bell microwave systems, to transmit high speed data.
EXECUNET	An offering by MCI Telecommunications Corp. whereby a subscriber calls a telephone in another city using MCI's PLS microwave system in between and local telephone exchanges at the end to switch and complete the call.
FAX	Facsimile reproduction over telephone circuits.

FX	Foreign Exchange service offered by common carriers to business whereby a user in one city can reach a business in another city by dialing a local number.
HI-LO	A PLS offering by AT&T which attempted to deaverage the uniform pricing policy for lower-cost high density service and higher-cost low density service in order to prevent cream-skimming by SCC's.
HOTLINE/QUICKLINE	PLS offering by Western Union which permits a customer needing service between two specific locations to ring one end without even dialing or signaling. This saves time and no manual intervention is required.
INSTANT PRIVATE NETWORK	Offering of private line switched service by RCA Americom, a DSC.
INFOCOM	An offering of shared line and computer switching services by Western Union to private business concerns.
KTS	Key Telephone System. A terminal device offered by IC's. KTS's provide for direct selection of an outside line from a multiple telephone set. Functions such as line holding and intercommunication are selected at the instrument. Visual indications are given as to the status of each line associated with the equipment.
LOCAL EXCHANGE	The residential telephone service offered by AT&T and the ITC's.
MODEM	Contraction of the two words <u>modulation</u> and <u>demodulation</u> . Equipment which receives a signal in one form and transforms it into a signal in another form such as an analog-digital conversion.

MPL	Multi-Schedule Private Line Service. The tariffed service offered by AT&T as a replacement for its HI-LO tariff.
MTS	Message Toll Service. The basic long distance service between local exchanges and offered by AT&T and the ITC's.
PBX	Private Branch Exchanges. Offered by the IC's, they are terminal equipments which allow for communications within a particular location such as a building. A typical PBX would be a switchboard used by a business. PBX systems are classified as small (up to 40 telephones); medium (between 41 and 100 telephones); and large (over 100 telephones).
PLS	Private Line Service. Provision of specialized or leased line communications services through microwave, satellite, value added or landline networks, as distinguished from public exchange or long distance MTS. It is point-to-point dedicated circuits for specific uses.
PMS	Public Message Service. The telegram service offered over Western Union's switched networks.
SERIES 11,000 TARIFF	A discount rate for bulk communications offered by AT&T to attempt to blunt the entry of SCC's into the PLS market.
SPACETEL	A private line voice/data service offered on Western Union's WESTAR satellite system.
SPRINT	Switched Private Network Telecommunications Service. Offering by Southern Pacific Communications Co. of PLS on a shared basis to the user who does not have enough volume to warrant a fully dedicated private line.

TELEX	Western Union's switched public teletypewriter network.
TELPAC	AT&T's principal tariff response to the entry of the SCC's into the PLS market.
TWX	The teletypewriter exchange network of AT&T acquired by Western Union in 1971.
VERTICAL SERVICES	The range of terminal services offered by the IC's: from PBX, switchboards, KTS, extensions, modems, to the basic "black" telephone instrument.
WATS	Wide Area Telephone Service. Offered by AT&T; the user pays a flat fee for unlimited long distance calls within specified geographical areas.

"Other than in this market, which comprises only a very small part of the revenues realized by the Bell System and Western Union, the domestic communications industry was properly characterized in the mid-1960's as one where monopolists provided a limited number of homogeneous communications services."¹¹⁰

As a corollary, most competition within the industry could thus be characterized as non-price competition. The alternative types of service offered by the common carriers (voice, record, public message); the prohibitions on alien connections to the Bell System; the vertical supplier relationship of Western Electric to AT&T; and the behind the scenes coercion of new rivals and their financial backers, were the dominant non-price competitive elements exhibited by the established common carriers.

Concerning quality of service, this period lacked the price competition inducements to efficiency and reliability which ordinarily ensure a sustained high level of quality. As a result, product and service quality were determined more by the supplier, rather than demanded by the user, even considering the attention of the FCC to these matters.

2. Post-"Above 890"/Carterfone/MCI

The late 1960's brought the reality of competition to two select markets in the telecommunications industry. The FCC, in its rulings and substantiations of the "Above 890," Carterfone and MCI cases, had concluded that the PLS and terminal equipment markets were indeed supportive and in need of competition. Essentially the FCC's reasoning was that the ubiquitous black dial telephone instrument, the symbol of telecommunications up to the 1960's, was no longer able to serve as the sole answer to the growing communications needs of the country.

Technological developments outside of the telecommunications field were radically expanding the possible applications of the telephone network through the use of specialized terminal equipment, and in turn this created demands for specialized PLS which could not or might not be effectively provided over existing telephone company or Western Union facilities.¹¹¹ The technological development which dwarfed all the others was the emergence of the digital computer.

Accompanying this breakthrough in the design of computers was a parallel revolution in electronics in general. The transistor, integrated circuits, and the minicomputer offered sharp increases in computing power while also

offering reductions in equipment cost:

It was clear by the mid-1960's that the computers and related technology had many potential applications throughout the common carrier system. Thus the technological revolution that produced the demand for specialized communications also produced many of the solutions as well.¹¹²

The proliferation of special requirements thus raised questions in the FCC's mind as to whether it was in the public interest to rely principally on a single terminal equipment supplier (Western Electric) and the PLS offerings of the established common carriers or whether the two markets would be more efficient with the open competition of the free market. As can be seen from the "Above 890," Carterfone and MCI cases, the FCC opted for the latter alternative.

The responses of the established common carriers to the FCC rulings in these three cases cited provide intriguing reading, especially in light of the technological background of this period. The opening of two previously closed markets to new IC's and SCC's produced many "protective" responses by the established common carriers. The vertical supplier relationship of Western Electric to the total telecommunications market appeared headed for diminution. Additionally, product strategy, quality, and differentiation now would be more than just meaningless phrases. Whereas marketing executives were non-existent or influentially

insignificant before these three FCC rulings, their importance increased dramatically among the established common carriers and Western Electric/ITC manufacturing subsidiaries during the late 1960's.

a. Private Line Services

As can be seen in Figure 4-3, the selected examples of PLS have grown greatly as compared with the pre-"Above 890"/Carterfone/MCI period, and although the vertical services offered by the IC's are essentially the same as in Figure 4-2, the present terminal equipment market has multiple firms, most of whom are independent of the established common carriers, and produces more innovative equipment. However the contrast in PLS is most striking. The "Above 890" decision which permitted the private construction and use of microwave facilities by private business concerns was the real catalyst of the now burgeoning PLS market, and provides a starting point for examining the recent conduct of the PLS market.

AT&T introduced TELPAK in 1961 as a competitive response to the private microwave alternative created by the "Above 890" decision. It was a bulk service offering, discounted, for private lines. It contained two rate elements: a base capacity provided between specified points at a flat monthly airline-mile rate and terminals for which the rates

SUPPLIERS SERVICES	TELEPHONE COMPANIES		TELEGRAPH COMPANY	OTHER COMMON CARRIERS				INTERCONNECT COMPANIES	
	AT&T	ITC'S		SSC'S	VAN'S	DSC'S	RCC'S	WESTERN ELEC&ITC'S	IC'S
PUBLIC	<u>LOCAL EXCHANGE</u>	<u>LOCAL EXCHANGE</u>	<u>PUBLIC SWITCHED TELETYPEWRITER</u>					<u>TERMINAL EQUIPMENT</u>	
	<u>LONG DISTANCE</u>	<u>LONG DISTANCE</u>	PMS TELEX TWX					VERTICAL SERVICES	
	MTS	MTS						PBX KTS	
PRIVATE	<u>PLS</u>	<u>PLS</u>	<u>PLS</u>	<u>PLS</u>	<u>PLS</u>	<u>PLS</u>		EXTENSIONS SWITCHBOARDS HANDSETS MODEMS DATASPEED 40	
	FX CCSA TELPAC WATS SERIES 11,000 DDS/DUV MPL AUTOVON	FX CCSA AUTOVON	DATACOM HOTLINE/ QUICKLINE INFOCOM AUTODIN	SPRINT EXECU- NET FX CCSA	PACKET- SWITCH- ING	FAX			
						SPACETEL INSTANT - PRIVATE NETWORK		TRANSMISSION & DISTRIBUTION EQUIPMENT	
NOTE:				TELECOMMUNICATIONS	MARKETS	<u>UNDERLINED</u>			

Examples of Selected Telecommunications Services
Post-"Above 890"/Carterfone/MCI 105, 106, 107, 108, 109

Figure 4-3

varied by type of terminal. The original TELPAK rates were:

	Voice Maximum Equivalent (VE) Channels	Monthly Charge Per Airline-Mile Per VE Channel
TELPAK A	12	\$1.25
TELPAK B	24	.83
TELPAK C	60	.42
TELPAK D	240	.19

In other words, a private line user of 240 channels paid 15 per cent of the rate per channel charged the user whose requirements were for 12 lines.¹¹³ The FCC ruled on the lawfulness of these bulk discounts in 1964 and found TELPAK and other PLS offered by the other common carriers to be "like" communications services and that therefore any justification of rate distinctions would have to include showings that: (1) they are a competitive necessity; and (2) they do not impose a burden on other users, i.e., the rates for the service are compensatory by themselves and the service does not rely upon revenues from other services such as MTS, to meet operating expenses.¹¹⁴ The result was that the FCC ruled TELPAK A and B unlawful, seeing no competitive need for them because the number of channels was too small to justify a private microwave system. The FCC saw a competitive need for TELPAK C and D but stated that AT&T had not

shown them to be compensatory. However the FCC allowed AT&T to continue to offer TELPAK C and D pending submission of data showing them to be compensatory or not. The ironic fact is that as of late 1976 the same issue remained unresolved and AT&T was still offering the identical services, although the rates had been revised several times. On September 23, 1976, the FCC finally ruled in this matter and found TELPAK C and D's rates to be unduly discriminatory with PLS offered by other common carriers and ordered AT&T to eliminate them and refile new bulk offerings within eight months consistent with the guidelines delineated in the Memorandum and Opinion Order of Docket 18128.¹¹⁵ (Note: Although TELPAK was originally an AT&T offering, Joint TELPAK with Western Union was established in 1968 following the latter's claim that it was about to lose crucial U.S. government private-line business to AT&T's TELPAK. Within the DOD, TELPAK is administered by DCA and lines are added or dropped, as daily circuit requirements dictate, from a common pool of AT&T and Western Union PLS lines.¹¹⁶ The outcome of Joint TELPAK, given the FCC's ruling in Docket 18128, remains to be resolved.)

Another early response by AT&T in PLS offerings was WATS which essentially provides discounts for intensive users of the public switched telephone network in various

geographical areas and is available on either a measured or full time basis. The competitive necessity to offer WATS was lacking since AT&T's Long Lines Department provides the vast majority of long distance MTS in the U.S., however the appearance of a new PLS offering such as WATS in the early 1960's can be viewed as a marketing scheme to attract customers. Recalling the "Seven Way Cost Study" of 1964, AT&T's rate of return on its essentially monopolistic MTS and WATS services were 10.0 per cent and 10.1 per cent respectively whereas its rate of return on TELPAK, in the competitive PLS market, was only 0.3 per cent. Western Union vociferously argued then and SCC's continue to argue today as well, that AT&T was subsidizing its competitive market offerings with its monopolistic services.

Additional PLS offerings by AT&T, precipitated by the MCI decision of 1969 included Series "11,000" which was a broadband service to allow innovative uses by users requiring large contiguous bandwidths, and the Hi-Lo tariff, introduced in 1973 as a response to the inter-city SCC's. To understand the Hi-Lo tariff, one must realize that AT&T historically has based its costs to consumers on the average cost between higher cost-low density service and lower cost-high density service. AT&T and the other established common carriers claim that the SCC's have been able to "cream skim"

the lucrative high density inter-city routes and still cover their costs whereas the established common carriers must also provide service in rural low density areas where unit costs of service are incrementally higher. Thus AT&T's Hi-Lo tariff was an attempt to deaverage its PLS charges based on the route utilized.¹¹⁷ In January 1976 the FCC ruled the Hi-Lo tariff rates unlawful and AT&T has recently submitted its MPL service to replace it. MPL differs primarily from Hi-Lo in the number of "Hi-Density" cities identified and there are a few additional minor changes also.¹¹⁸

Further responses of the established common carriers include such PLS services as DDS/DUV and Datacomm although it might be more correct to say the technological revolution mentioned earlier in this section was the spur to these new services albeit they were hastened by the advent of the SCC's. The DDS/DUV offering makes use of the lower portion of the microwave transmission spectrum in sending digital information under the voice channels of the remaining portion of the spectrum. Western Union Datacomm is likewise a digital PLS offering which seeks to obtain businesses interested in the medium speed transmission of data. Additionally, such unique services as INFOCOM and HOTLINE/QUICKLINE strengthened Western Union's PLS offerings

and when weighed with AT&T's PLS services and those of the ITC's, represented a significant counter to the SCC's and their PLS offerings sanctioned by the FCC.

The MCI decision in 1969 heralded a new era in PLS. Soon thereafter and continuing to the present, the SCC's, VAN's and DSC's have offered new and different PLS ranging from EXECUNET, SPRINT, INSTANT Private Network, SPACETEL and the various packet-switching schemes of the value-added carriers. Businesses have increasingly come to these new telecommunications carriers to satisfy their increasing data/voice/record telecommunications needs. That a market exists in PLS cannot be denied: one only has to study the tenacious, varied responses of the established common carriers since the early 1960's in an attempt to preserve their monopoly of PLS revenues. However the SCC's in particular have experienced difficulty in the PLS market and the reason(s), although ostensibly clear, in actuality may be more complex as indicated below.

DATRAN, a major SCC, filed for bankruptcy in August 1976 and even though many analysts attributed its demise to undercapitalization,¹¹⁹ the established common carriers will point to it as a vindication of their argument that the PLS market cannot stand competition. As a further case in point, MCI, the SCC trailblazer, has recently

been charged by the FCC with operating its EXECUNET PLS offering as a public dial-up telephone service instead.¹²⁰ The prospect of MCI failing (EXECUNET is its major revenue source) is enough to give pause to what the FCC ruled in 1969 when it created the SCC mini-industry and its PLS market.

Actually the EXECUNET case focuses sharply on a crucial problem of the PLS market: the original MCI decision said only that SCC's would be authorized to offer private line services without defining what a private line was. Since then the SCC's have pushed for a broad definition while the established common carriers have lobbied for a narrow and restrictive definition.¹²¹ Thus perhaps the FCC should offer an explicit description of the PLS market it opened to competition seven years ago while simultaneously perhaps the SCC's which remain should do a better job in estimating the specialized telecommunications needs of their private users; the SCC's should probably not simply pool their requirements into a national PLS offering.

b. Terminal Equipment Services

Figure 4-3 illustrates the entry of new IC's into the terminal equipment field, the entry being a direct result of the FCC's Carterfone ruling of 1968. Whereas Western Electric had been the single dominating firm in the terminal

equipment market since its purchase by American Bell (AT&T) in 1881, the influx of new IC's in recent years has decreased Western Electric's market share and "loosened" the syndrome that only Western Electric could supply terminal equipment needs. In fact a major social benefit, that of technical innovation, has accompanied the introduction of mass IC competition. Although the vertical services enumerated in Figures 4-2 and 4-3 are the same, the variety and product differentiation are certainly more pronounced now than ever, witness AT&T's "decorator phones" for example.

As an illustration of the effects of competition among IC's, the following facts relating to data modems are enlightening. In the mid-1960's as computers became more important in telecommunications and faster, the demand for higher speed modems increased. Small IC companies responded dramatically to this demand whereas the telephone companies and their manufacturing subsidiaries responded more slowly. For example, as early as 1965 a non-carrier IC marketed a modem capable of data transmission speed of 4800 bits per second (BPS), but AT&T did not market a similar modem until mid-1972. Similarly IC's marketed 7200 BPS and 9600 BPS modems in 1968-69 whereas AT&T first marketed a 9600 BPS modem in 1974.¹²² The same types of examples exist with respect to IC spurred innovation in the PBX and KTS terminal

equipment sub-markets. In fact the developments in the terminal equipment field made by both the established common carriers and their manufacturing subsidiaries and the IC's have been among the most far-reaching advances in the telecommunications industry in the past decade, ranking alongside the development of communications satellites. Indeed, AT&T has encountered opposition to its DATASPEED 40 communications terminal device with the FCC claiming the "intelligent terminal" device is "too smart" and performs prohibited data processing services in violation of the 1956 consent decree signed by AT&T (which among its clauses stated AT&T could not enter an unregulated business such as data processing) and the FCC's Computer Inquiry findings of 1970. The resolution of the DATASPEED 40 case will probably await the findings of the recently announced "new" Computer Inquiry mentioned previously in section A.2. of this chapter.

3. FCC Docket 20003¹²³

Docket 20003 is a recent investigation by the FCC into the economic effects of competition in the PLS and terminal equipment markets as well as jurisdictional separations and rate structure procedures. Having lived with the Carterfone and MCI decisions for over seven years the FCC felt it was necessary to take a close look at the PLS and terminal equipment markets specifically addressing (1) whether the

existence of competition in the market for PLS and terminal equipment has caused or is likely to cause a significant loss of revenues by the telephone industry or an increase in basic telephone rates; and (2) whether the beneficial cross-subsidies (between telecommunications markets) claimed by the telephone industry do in fact exist, and if so whether they will be adversely affected by the presence of competition in the PLS and terminal equipment markets.¹²⁴ In studying the impact of competition within the PLS and terminal equipment markets, relating to the telephone industry specifically, the FCC asked three essential questions concerning each market. An affirmative answer to any one of them would have been grounds for invalidating the competitive actions in the PLS and IC markets begun with the "Above 890" MCI and Carterfone cases respectively. The questions were:

1. Are there structural considerations in the market which justify precluding competition? This question includes the issue of economics of scale and the implications of market diversity and incentives to innovation.

2. Are there engineering constraints on the telecommunications network that might preclude competition? Are there any reasons to expect a reduction in network performance or reliability as a result of competition?

3. Will competition cause such severe economic harm to the telephone companies that the attainment of policy objectives is seriously jeopardized?¹²⁵

Without delving into the rationale and reasonings of the FCC, the regulatory body essentially upheld its prior rulings in "Above 890"/Carterfone/MCI and found that competition in the PLS and terminal equipment markets had not harmed the telephone industry but rather had contributed to the well-being of the telecommunications industry as a whole and should continue. In conjunction with Docket 18128, which dealt with the PLS market in general and TELPAK C and D specifically, Docket 20003 was a reaffirmation by the FCC of the advantages of competition. With specific regard to competition within the terminal equipment market, the FCC found:

no evidence in this docket of natural limitations in supply such as economies of scale, substantial economic barriers to entry or conditions of service which would support a finding that there is a natural monopoly in the provision of terminal equipment or private communications systems. Moreover, electric and gas utilities are in some ways similar to telephone companies. In each case, the service provided travels the lines of the electric or gas company, and telephone company, to a terminal piece of equipment. Electric and gas companies do not normally supply the terminal piece of equipment.¹²⁶

In summary, certain identifiable benefits of competition in the PLS and terminal equipment markets have been identified by the FCC: quality of service and the availability of new services has improved; lower rates for PLS and terminal equipment users have resulted; and the established common carriers have become more responsive to

marketplace needs than when the PLS and terminal equipment markets were basically within their sole domain. The social benefit has been substantial in the FCC's opinion.

4. Thoughts on the Future of Market Competition

The PLS and terminal equipment markets as well as the remaining four markets must confront several issues and events in the near future, the resultant matrix of outcomes having a profound shape on the future of telecommunications market competition. These include the AT&T and USITA sponsored CCRA which will have a decisive impact on the SCC's and IC's if passed by Congress; the current Department of Justice Antitrust Suit against AT&T seeking its breakup and divestiture of Western Union, either or both of which would have potentially cataclysmic repercussions in all the telecommunications markets; the portentous presence of SBS in the DSC field which eventually might become the vehicle behind which IBM achieves a significant share of future telecommunications markets; and lastly the ongoing FCC Computer Inquiry which must arrive at a workable distinction between data processing and data communications to permit the most efficient cooperation between the regulated telecommunications industry and the unregulated data processing industry.

C. PRICE DETERMINATION/RATEMAKING PRINCIPLES

An understanding of the means of price determination for services in the telecommunications industry is necessary to appreciate the arguments posited by the common carriers and the FCC for interstate services and the common carriers and state public service and utility commissions for intrastate service, with regard to price adjustments within individual telecommunications markets.

Under the Communications Act of 1934, the FCC is tasked to determine the revenue requirements of a common carrier in order to provide interstate services while the state regulatory bodies are tasked to determine the revenue requirements of those common carriers engaged in intrastate services. The revenue requirement is an estimate which is designed to just cover the carrier's costs and to allow reasonable dividends and interest payments that will attract new capital.¹²⁷ Two important concepts integral to the formulation of a common carrier's revenue requirement are the rate base and the rate of return. Appendix A contains a detailed explanation of their relationship in arriving at the common carrier's total revenue requirement. After the revenue requirement is formulated, the rate schedules for the various telecommunications services offered by the common carriers are devised so as to realize the total revenue requirement of the common carrier;

these schedules are then embodied in the tariffs filed with the applicable regulatory agency.

1. The Rate Base and Rate of Return

As a reading of Appendix A will illustrate, the revenue requirement of a common carrier depends greatly upon (1) the rate base and (2) the rate of return. In fact, the FCC and state regulatory bodies prescribe the rate of return by administrative decree with the intention of having it reflect as nearly as possible the cost of capital.

If the regulatory body selects a rate of return that is too low, the economic well-being of the carrier is jeopardized. If the regulatory body picks a rate of return that is too high, the public rate-payers suffer excessive rates and the carrier is unjustly enriched.¹²⁸

The futility of rate of return regulation becomes readily apparent when the fundamental objective of regulatory enterprise is considered: the effort to limit the rate of return while consumer demand and lack of competition guarantee a minimum profit on the rate base.¹²⁹ Thus the minimum profit, or rate of return, induces a wide range of behavior patterns from the common carriers to expand the rate base, thus creating additional revenue above that necessary to cover operating expenses and satisfactory dividends. These behavior patterns have been modeled by Averch and Johnson¹³⁰ and the methods cited include the

following examples: (1) slow depreciation expenses, i.e., straight-line versus accelerated; (2) lax procurement practices; (3) building in excess capacity; (4) choosing more capital-intensive technology than necessary; (5) owning equipment, vehicles, and buildings when leasing would be cheaper; and (6) setting excessively high standards of performance, quality and reliability even if nominal, which pleases regulators and consumers who are unaware of the increased rates entailed.¹³¹ Although the Averch-Johnson model has been widely applied, significant disagreement exists as to its validity in whole or in part by such theorists as Kahn, Baumol and Klevorick.^{132,133,134} The disagreement centers around the fact the model has never been empirically proved.

The first of these practices cited, slow depreciation expenses, is an extremely involved issue encompassing historical accounting methods, political issues, and technological innovation. The standard system of accounts imposed by regulatory agencies, allows many charges which non-utility companies would write-off as current expenses, to be capitalized and written-off over long periods. Thus AT&T can show a moderate 6 to 8 per cent return on capital which contrasts sharply with a 27 to 30 per cent pretax profit on revenues.¹³⁵ It is like Social Security according to one FCC accountant: "capitalizing so much and depreciating it

slowly just postpones the costs."¹³⁶ To accelerate depreciation costs however would increase operating expenses of the common carriers and require politically unpopular rate increases. Thus the economic replacement function lingers on unresolved: long depreciation periods widen the gap between the higher cost of replacing worn-out equipment and the funds generated in depreciation reserves.¹³⁷

The fact that the revenue requirements of the common carriers are figured in the aggregate, for all services offered, also poses a further problem with the rate base and the rate of return regarding the prices charged for specific services. Simply stated, if a monopolist or a company exhibiting monopolistic tendencies can set prices arbitrarily for specific services as long as the overall rate of return matches that set by the regulatory agencies, then that firm can raise the prices charged for certain services far above cost in order to subsidize below cost pricing of services otherwise unable to pay for themselves. This cross-subsidization was evident in the "Seven-Way Cost Study" mentioned previously and will be discussed later in this chapter.

Thus it is evident that in the regulated telecommunications industry, close supervision by regulatory bodies is essential in order to prevent the specter of "mushrooming"

rate bases and the general problem cited earlier of the frustration of rate of return regulation. With respect to AT&T, the FCC has made several serious attempts to deal with both the rate base and the permissible rate of return. These efforts began in 1965 with the General Telephone Investigation, and have continued up through February 1976 being successively divided into various phases, absorbed into new FCC Dockets, or culminating in temporary limits on the rate of return. Figure 4-4 traces this meandering trail of FCC Dockets and decisions which currently permit an overall rate of return for AT&T of 9.5 to 10.0 per cent depending upon efficiency improvements.¹³⁸ The delays and offshoot investigations reflected in this eleven year record directly demonstrate the difficulty of small regulatory staffs attempting to apply the equations of Appendix A to such large corporations as AT&T. Although all the decisions for rates of return shown in Figure 4-4 were with specific reference to AT&T, the FCC states that it is general practice for the other common carriers to change their tariffs accordingly.¹³⁹

It can be readily seen that as a competitive surrogate, the FCC's and state regulatory agencies' oversight of the regulated telecommunications industry is bereft with problems, especially with the rate base and the rate of return.

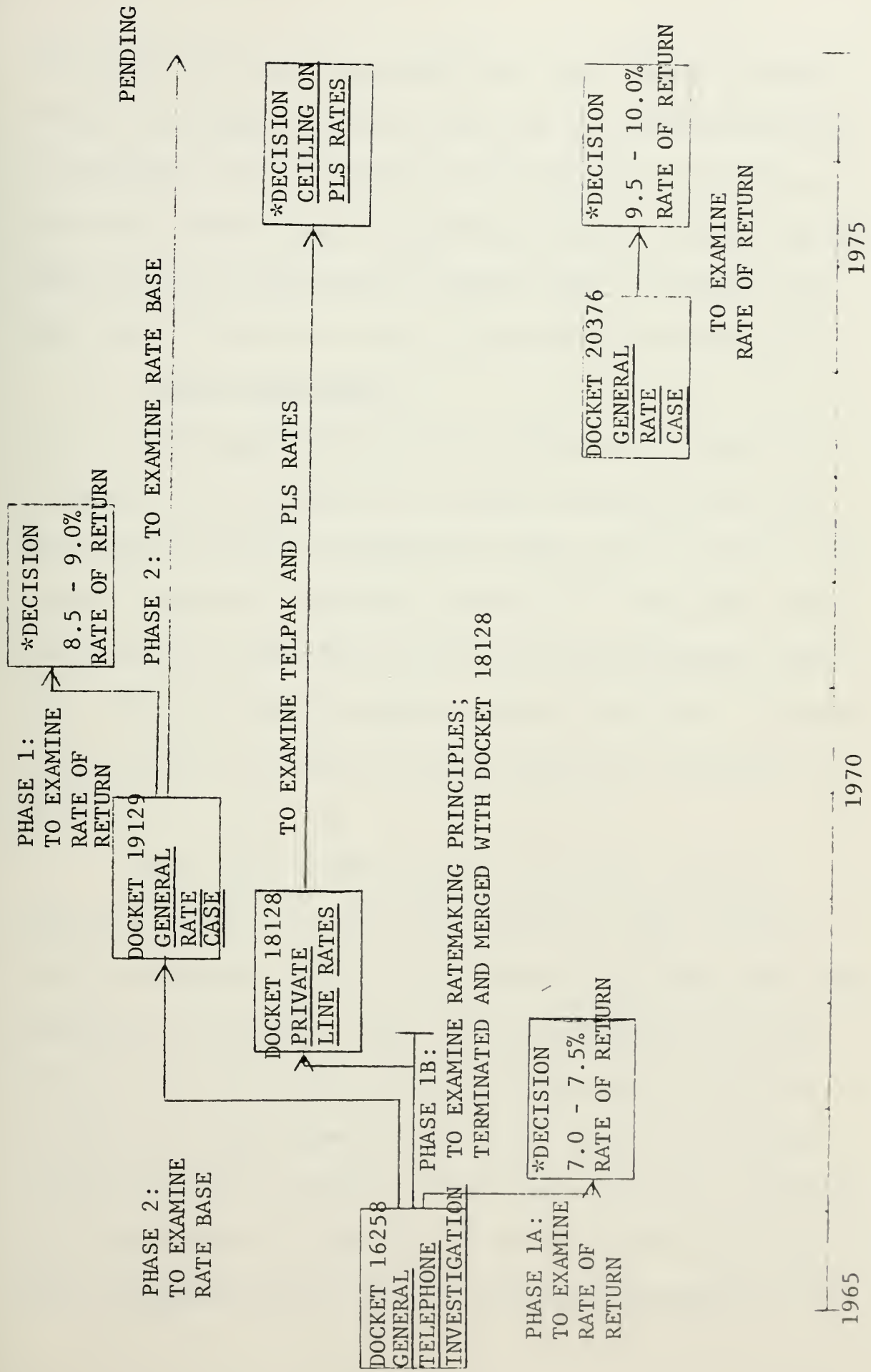


Figure 4-4

One only has to read the sensational experiences of James Ashley's employment with AT&T and the rate increase efforts of Southwest Bell to realize the shenanigans that can occur given the rate of return regulatory climate. Texas, the last state without a state public service body to oversee utilities, now has one as a result of Ashley's disclosures.¹⁴⁰

2. Pricing Philosophy

The Communications Act of 1934 does not state so explicitly but virtually all parties involved in the telephone industry and its regulation agree that it carries the implied mandate of "universal service."¹⁴¹ For this reason the effects of competition in the telecommunications industry's PLS and terminal equipment markets can have a definite influence on the pricing of basic residential telephone service.

Under this assumed mandate, AT&T has espoused a "value of service" concept which seeks to place a higher cost for telephone service upon business customers than upon residential customers. That such a philosophical opinion should emanate from the corporate headquarters of AT&T and the ITC's is indeed questionable but it is a fact that the "value of service" concept has held down household telephone bills and enabled the Chairman of AT&T to claim that "there isn't a single State in the U.S. where the residential user

pays the full cost of his phone service."¹⁴² And for sure, telephone service is within the reach of most people in the U.S. today: at the end of 1976, AT&T had 123.1 million telephones in service;¹⁴³ including the ITC's, the U.S. had 149 million telephones in service or 69.5 telephones for every 100 people.¹⁴⁴

Another pricing concept practiced by the telephone common carriers, and specifically AT&T, is average pricing, whereby the telephone charge to any residential exchange customer is the same regardless of whom or where he is calling. Again this is an example of a philosophical decision reached by AT&T, but which it can afford to do as a monopolist in the long distance telephone market. Yet this concept faces a serious challenge when confronted with an SCC's competitive PLS offering. The FCC, by its MCI decision,

...has permitted newcomers to the phone business to operate private-line service between major cities in competition with Bell System long-distance service. Our basic objection is that these competitors have moved into the heavy-traffic routes and cut prices. They can do that because we have traditionally charged more on these routes, relative to cost, than on more remote routes where traffic isn't so heavy. In effect, our competitors have skimmed the cream off the heavy intercity business by picking and choosing the areas they want to serve. We have to stand ready to serve customers not only in major cities but everywhere else in the U.S.¹⁴⁵

The perceived threat of competition from SCC's, VAN's, DSC's, and also terminal equipment manufacturers has clearly

concerned all the established common carriers and can be seen in such relatively new pricing responses as the now defunct Hi-Lo tariff and its successor, MPL, and also in the plan of AT&T to institute usage sensitive pricing (USP), a unit pricing method, for all local and long distance telephone calls nationwide by 1980.¹⁴⁶ Designed to more accurately reflect costs, AT&T will be able to determine the caller's station, the duration of the call and its distance by means of its new electronic switching systems (ESS). Thus there appears to be a move towards cost-related pricing which, when it occurs, will substantially curb the practice of all the established common carriers denoting service offerings by either their contributions (excess of revenues over cost) or subsidies (excess of costs over revenues) and the resulting necessity for cross-subsidization.

3. FCC Docket 18128¹⁴⁷

The prevention of predatory pricing by the established common carriers who are able to cross-subsidize competitive PLS with their essentially monopolistic services, requires a solid, accurate definition of the cost of each service offered and a regulatory means of administering such a definition. To project revenues from a given common carrier's service offering in order to see if it will be compensatory (cover its costs) and therefore a contribution to overall revenue,

is a most difficult task for the FCC or a state regulatory body - more difficult than determining the overall revenue requirement. The main reason for the difficulty is that a choice must be made between two fundamentally different versions of cost: fully distributed cost (FDC) and long run incremental cost (LRIC). The aim of defining the cost of a telecommunications common carrier's specific service offering was the reason behind Docket 18128, the Private Line Rate Case.

Very simply stated FDC methodology requires that a new service offering share the common cost of land, equipment, buildings, and personnel, in addition to the incremental costs incurred in these factors due to the institution of the new service. LRIC, on the other hand, just requires that the whole incremental cost of the new service be covered so that users of the new service will not "burden" users of other services: they pay solely for the incremental costs.

AT&T, in particular among the established common carriers argued for the LRIC methodology based upon sound business practice:

No business, regulated or unregulated, uses a rigid FDC approach in setting prices for its goods and services. They do not use FDC because it cannot tell them what it costs to provide a product or service, whether it will sell or not at the price indicated,

what the profit to the firm would be, what price will yield the optimal volume of business, or any of the other information relevant to sound business and economic pricing.

A going business with more than one product or service to sell, in deciding whether to offer a new service, will ask a threshold question "Will my business be better off by offering the service, or not?" An FDC approach cannot provide an answer to that question since it is no more than an arbitrary allocation of historical costs. Techniques such as the long run incremental analyses established as being economically sound by the record in this proceeding, are the only techniques which can answer such a question.¹⁴⁸

The decision by the FCC in Docket 18128 however went against AT&T. The FCC stated that although LRIC would probably be the proper methodology in a competitive, rational decision-making environment, it would be extremely easy for a regulated common carrier to mask some of the actual LRIC behind monopoly services or common costs and thus still underprice SCC's, VAN's and DSC's in the PLS market. Also, the FCC stated that its small staff would be hard pressed to find such manipulations if they did occur and that additionally, its present accounting system does not segregate costs by service, so that monitoring the LRIC of individual service offerings would be difficult at best. For these reasons, the FCC adopted the FDC methodology of pricing in Docket 18128. Additionally,

...the Commission held that AT&T may not price its basic telephone monopoly services above the allowable overall interstate rate of return -- in other words --

the prescribed overall interstate rate of returns for AT&T will also be the ceiling for MTS and WATS rates. Moreover, the competitive private line services must be priced to earn at least their authorized interstate rate of return within a reasonable period of time.

...The ceiling for monopoly service rates and the floor for private line service rates are necessary to protect the ordinary telephone ratepayer from effectively subsidizing Bell System ventures in the competitive private line field. Sufficient flexibility, however, is built into private line pricing to accomodate legitimate pricing approaches by AT&T which are intended to build up a market that ultimately will prove capable of earning overall interstate rate of return.¹⁴⁹

D. GOVERNMENT REGULATION

As can be seen from the history of the telecommunications industry related in Chapter Two and from the imprint that regulatory bodies have had on the industry's structure and conduct, government regulation is a hallmark of the industry. It is axiomatic that since telecommunications common carriers are public utilities they will exist in an environment of regulation. The difficult part, as elaborated in this thesis, is that the regulatory process is one of extreme balance.

Regulatory agencies attempt to prevent the firm from employing its monopoly base to levy extortionate prices from the subscribing public. At the same time, the agency endeavors to allow the firm sufficient revenues to compete in the capital market. But identifying the interest of the firm and the interest of the consumer is neither precise nor automatic.¹⁵⁰

The balance referred to above is one of the reasons for the number of regulatory/quasi-regulatory agencies acting as players in the telecommunications markets. In the executive branch of the federal government alone, three agencies/departments (FCC, OTP, Department of Justice) have a direct influence on the course of the telecommunications market's structure, conduct and performance. The FCC is chartered by the Communications Act of 1934 to regulate interstate and foreign communications common carriers. OTP was created in 1968 in order to provide advice to the President on national telecommunications. The Department of Justice, in its pursuit of antitrust violations, continues to have a profound impact on the behavior patterns of all the telecommunications common carriers. It is significant to note that the FCC, specifically through its rulings, and OTP, in general through its policy statements, have usually agreed during the 1970's that the competitive aspects introduced in the telecommunications industry have been beneficial. Further, the mere charge of "monopoly" by the Department of Justice demonstrates its continuing vigil to maintain regulation as a viable and effective substitute for pure competition. If all three entities were called upon to vote in the upcoming Congressional debate on the CCRA bill, in the authors' opinion, all would probably vote "nay," a direct rebuke to AT&T and USITA.

On the state regulatory level, an AT&T-NARUC axis is sometimes alleged.¹⁵¹ Indeed, state public service or utility commissions and NARUC have generally opposed the FCC's Carterfone and MCI rulings.^{152,153} Their contention is that the FCC was attempting to regulate intrastate as well as interstate PLS and terminal equipment matters in violation of FCC's charter. This opposition is not to be dismissed lightly either since state regulatory agencies regulate more than two-thirds of the telecommunications industry and are therefore in a position to subvert FCC competition policy.¹⁵⁴

However the U.S. Court of Appeals Telerent decision of April 1976 asserted the FCC's pre-emptive jurisdiction over terminal equipment and re-enforced the FCC's competitive initiatives in the terminal equipment market. The Court stated that although the terminal equipment might only be connected for intrastate purposes, it is connected to an interstate telecommunications network.¹⁵⁵ Thus in the terminal equipment market, states must now subscribe to FCC standards for terminal equipment interconnection. This has permitted more use of customer owned and supplied equipment in consonance with the intended purpose of Carterfone.

It therefore seems generally apparent that spearheaded by the FCC, the federal government is successfully orchestrating

competitive initiatives in the terminal equipment and PLS markets with further prospects for competition dependent upon the outcome of the current antitrust suit brought by the Department of Justice against AT&T and the CCRA presently before the Congress.

E. OVERVIEW

As mentioned earlier in this chapter, the telecommunications industry is composed of many markets, many of them interrelated and with a degree of substitutability. The "set" of telecommunications market players illustrated in Figure 4-1 is certainly not static but rather dynamic, the degree of change determined by such things as federal or state regulation, technological innovation and market performance by individual players. Several things to watch as far as ultimately changing the make-up of the "set" are the outcome of the new FCC Computer Inquiry and the success or failure of the SBS DOMSAT entry spearheaded by IBM. The ultimate resolution of data processing with data communications within the telecommunications industry is the biggest "unknown" presently confronting its future. A cause for optimism is the recent success of Western Union, once labeled the "sick carrier"¹⁵⁶ of the industry, in acquiring two new large governmental contracts operating over a period of years:

(1) a DOD update of AUTODIN called "AUTODIN II"¹⁵⁷ and (2) a National Aeronautics and Space Administration (NASA) contract to develop a tracking and data relay satellite system, the largest NASA contract ever awarded for an unmanned space mission.¹⁵⁸

If one factor stands out among all others to the authors, it is the diversity of services offered which makes regulation so difficult. It is the multiservice common carrier, established or specialized, which makes the regulation of the industry so difficult.

If AT&T offered only one service produced by one machine, regulation would be easy. It is the diversity of products and the increasing complexity of services resulting from competition which breeds further problems. When is a private line service really message toll - when it allows switching between two firms, or among four firms? When is telecommunications in essence data processing - when the phone company reads a meter, adds up two numbers, prepares a bill? When is AT&T acting in response to competitive pricing and when is it acting as predator, cutting prices below costs and driving competitors out of business?¹⁵⁹

The future will certainly bring an increase in the range of new and different services offered by the telecommunication common carrier. The industry's regulation and yardsticks of performance will become even harder to measure.

V. PERFORMANCE OF THE UNITED STATES TELECOMMUNICATIONS INDUSTRY

A. INTRODUCTION

In the previous chapters, an overview and description of the structure and conduct of the domestic telecommunications industry has been presented. This chapter examines some of the important aspects of the industry's performance. Full appraisal of the telecommunications industry's performance is difficult because performance has many dimensions. Bain suggests six general criteria or measures for judging performance:

- (1) product performance and technological progress
- (2) selling cost
- (3) allocative efficiency
- (4) technical efficiency
- (5) full employment
- (6) income distribution.¹⁶⁰

Caves defines performance "as the appraisal of how much the economic results of an industry's market behavior deviates from the best possible contribution it could make to achieving these goals."¹⁶¹ This chapter will concentrate on the first four criteria, product performance and technological progress, selling cost, allocative and technical efficiency;

due to their scope, full employment and income distribution will receive only a cursory comment.

Both Bain and Caves mention, as a major obstacle in any study of market performance, the lack of data and empirical evidence on the various industry groups in the United States. The authors found this, for the most part, to be true in their attempts to evaluate the performance of the telecommunications industry. However in recent years, the Federal Communications Commission (FCC) has held extensive hearings concerning the economic aspects of the telephone sector, in particular the Bell System. Since the Bell System accounts for over 80 per cent of all business in the industry and almost all the data available relates to the Bell System, the major part of this chapter will look closely at the performance of AT&T, the Bell Operating Companies, Western Electric (the manufacturing arm) and the Bell Telephone Laboratory (the research and development arm).

A second obstacle in judging the performance of an industry is the lack of a performance standard or "norm." (Again, both Bain and Caves point out the inherent difficulties of establishing such a performance standard). In evaluating the performance of the telecommunications industry the authors found two disparate performance standards:

1. A "paper test" benchmark, offered by the Bell System. The performance of the telephone companies should be judged against price comparison studies, productivity studies and management consulting studies provided by the telephone companies.

2. A "market test" benchmark, created by competition in two areas, the equipment manufacturing market (commonly referred to as the interconnect market) and the private line service (PLS) market.

Drs. Baumol, Eckstein and Kahn discuss the benefits of competition as follows in their paper, "Competition and Monopoly in Telecommunication Services":

Economists have generally been predisposed to favor competition as a form of organization for an industry. They usually have taken this position not primarily because they feel that competition is desirable in and of itself but because they believe that it offers a number of important advantages. It gives greater scope to individual independence and freedom, creates more centers of power and avoids the political risk of excessive concentration of economic power. In economic terms, it offers three basic benefits to consumers:

- a. pressures for rapid innovation,
- b. pressures for maximal product quality at any given selling price,
- c. pressures to supply the service at minimum cost to consumers given the quality of the product.¹⁶²

Without further review of the arguments for competition, the authors agree with the stated position above and the FCC that a "market test" benchmark based on competition was an appropriate standard to examine the Bell System's performance, provided that competition actually exists.

A third obstacle encountered concerned the role of both state and federal regulatory agencies. As mentioned by Charles Phillips Jr., political and other forms of pressure often force these agencies to judge performance by criteria which differ somewhat from an economist's point of view. For instance, they may put undue importance on such dimensions as stability and continuity. Because of the very nature of their work, regulatory agencies must share in the responsibility of the industry's performance.¹⁶³ Since there is no data available on their performance, it is difficult to draw conclusions on how well the industry is actually performing.

Before our examination begins, a final point should be made. It is not the intent of the authors to pass a good or bad judgment on the industry's performance. Indeed, the Bell System has provided the United States with, what most people believe to be the finest telephone system in the world.

After a six-year study, the Federal Communications Commission concludes that the American Telephone & Telegraph Co. is providing 'excellent' telephone service at a reasonable cost to the public.¹⁶⁴

Rather, the authors' intent is to look at the industry's actual performance, particularly the Bell System and see how this performance compares to the "market test" of competition.

B. PRODUCT PERFORMANCE AND TECHNOLOGICAL PROGRESS

Bain defines product performance as:

how well the firms engaged design, determine the quality of, vary, differentiate, and progressively improve their products - all relative to that performance in these several regards which would achieve the best attainable balance between buyer satisfaction and the cost of production or, to what extent could the relationship of buyer satisfaction to the cost of production be significantly improved by lowering or raising quality, altering design, increasing or decreasing the real variety of quality or design among competing products, changing products more or less frequently and so forth.¹⁶⁵

As can be seen from the above definition, product performance itself, is multi-dimensional and difficult to define exactly. In examining product performance the authors relied primarily on data from the FCC, In the Matter of American Telephone and Telegraph and the Associated Bell Companies Charges for Interstate Telephone Service, Docket No. 19129. The FCC used a case study approach to analyze numerous products in three major areas:

- customer equipment and service
- transmission
- switching.

One aspect will be examined - the subscriber equipment market which is part of the customer's equipment and service area. (Similar results were observed by the FCC Trial Staff in the other areas.)

The subscriber equipment markets consist of people who require telephone equipment on their premise. The equipment may be a data modem which enables computers to "talk" to each other over telephone lines; it may be an office switchboard - a PBX; it may be a telephone instrument linked to extensions - Key Telephone Systems; it may include antique telephone sets, speakerphones or automatic dialing units.¹⁶⁶

Prior to the Carterfone decision in 1968, the subscriber equipment market belonged exclusively to the Bell System. They did not allow direct connection of privately manufactured or privately owned equipment onto the switched network. Direct connection of privately manufactured equipment was allowed to private lines since they did not transverse the public switches. The Bell System pricing and marketing policy during the pre-Carterfone era according to Mr. D. J. Mathews, AT&T Manager of Planning and Support was:

to provide the best possible service at the lowest possible cost. A market strategy that supports this objective indicates an 'anywhere, anytime, anything' service posture. It further shows that development is paced by corporate priorities as opposed to market requirements. This type of strategy maintains that the monopolistic position of the Bell System tends to

drive out any competitive threat. The pricing policy in support of this approach is to price low and in such a way that total revenues cover total costs. Pricing strategies for this period show them to be in consonance with the basic policy.¹⁶⁷

A subscriber was limited to one choice: lease an end-to-end service, a service that included line, switching and telephone instruments from the Bell System or lease nothing. For all practical purposes, equipment competition was non-existent.¹⁶⁸

In 1968, as a consequence of the FCC ruling in the Carterfone case, the subscriber was given an opportunity to lease non-Bell equipment. The Bell System response to the "new" subscriber equipment market can be characterized as (TL)² - "Too Little, Too Late." For the first time, comparison between Bell Telephone Laboratory (BTL)/Western Electric equipment and non-Bell equipment could be made with products being evaluated on their price, their quality, their cost and their merits; subscribers were now free to purchase non-Bell equipment, creating what is now called the interconnect market. A "market test" benchmark to examine performance had emerged. This competition precipitated a response from the Bell System which provided the rate payer and user with better products, lower costs, new features and shorter development schedules.¹⁶⁹

Typically, the Bell System's reaction to the new IC competition followed a definite pattern:

- 1) The subscriber buys non-Bell equipment, thus eroding the operating companies' rate base and diminishing Western Electric's market share.

That erosion prompts a reappraisal of Bell products by the Bell System.

- 2) AT&T must decide to buy a new general trade product or manufacture its own. AT&T is confronted with a classic make/buy decision. Invariably AT&T decides to "make."

- 3) Bell pursues stop-gap measures: the operating companies buy non-Western products on an interim basis but AT&T informs them that a new Western Electric product is forthcoming.

- 4) New equipment is introduced on an expedited basis.

- 5) Non-Western Electric products serve as a cost and price target for BTL/WECO. Sometimes equipment is redesigned to meet or beat the visible target established by general trade suppliers.

- 6) Western Electric delivers its products to Bell operating companies experiencing the most intensive competition from IC's.

7) The operating companies buy untested Western Electric equipment born in haste. Sometimes operating companies experience problems of cost, quality and/or reliability with such equipment.¹⁷⁰

In almost every instance, the above reaction pattern was observed by the FCC Trial Staff. Looking at it in more detail:

First, the subscriber buys non-Bell (or non-Western Electric) equipment because of better price, features, availability, etc. This erodes the "exclusive market" enjoyed by the Bell System. For example, in the common user data set market, competitors had captured 18 per cent of it by 1972.¹⁷¹ Bell's share loss leads to introspection and appraisal as evidenced by remarks from top management at AT&T:

* Now, data set development is a relatively short process, but would you believe it takes an average of five years between conception and function. That's longer than it takes an elephant!¹⁷²

* Broad comparisons of cost, size and features of Bell System and competitive devices indicated need for more variety in our PBX line for small to medium users.¹⁷³

* Bell Labs is too slow to be competitive with data modem technology.¹⁷⁴

* We have allowed our competitors to get 7-10 years ahead of us in design of data modems.¹⁷⁵

In this reassessment process, the Bell System determines its product line is not competitive.

Second, the Bell System is faced with a classic make or buy decision. In almost every case examined by the FCC, Bell chooses the latter and begins development.

- * Development of 5 new data sets was undertaken because Bell determined that they clearly intend to remain in the data business.¹⁷⁶

Third, the Bell Operating Companies purchase the non-Bell equipment on an interim basis.

- * The urgent need has prompted a recommendation to the operating companies to purchase outsiders suppliers systems...¹⁷⁷

Fourth, the Bell System develops and introduces new products on an accelerated basis.

- * The 812A (data modem) development was initiated on an expedited basis.¹⁷⁸

Fifth, the Bell System uses competitor products as a cost and price target.

- * With the new proposed data modem developments BTL and Western can meet the competition toe-to-toe-cost and features.¹⁷⁹

Sixth, the Bell Operating Companies press Western Electric for new products on a high priority basis.

- * Operating companies observed 'spending money some place else' was the best way to get AT&T, BTL and Western's attention.¹⁸⁰

Seventh, the Bell Operating Companies buy Western Electric equipment and find it 'over-valued' in terms of capability and cost.

* Having been burned too often, the Telcos simply do not believe AT&T/BTL price and availability estimates.¹⁸¹

Not every product made by Western Electric followed the above pattern exactly; however, for the most part, in the cases which the FCC examined, this pattern repeated itself again and again. The "market test" benchmark also allowed the Bell System to judge itself. It showed Western Electric that its product line was inadequate, its prices were high and where its equipment lacked features. It let Bell Telephone Laboratories know that its product development was lagging, its priorities were skewed and where certain areas of technology had the wrong emphasis.

To their credit the Bell System met the challenge with the following results:

- new products were introduced
- development time shortened
- costs were reduced
- obsolete products were dropped
- new features were introduced
- new tariffs were filed.¹⁸²

However, overall, using the market test - competition - as a benchmark in evaluating product performance, the Bell System was found deficient.

Technological progress refers to "how well an industry does" in the matter of invention (discovery) and innovation (actual applications of new discoveries). Bain asks the question: "Are they 'adequately' or ideally progressive in developing and applying new techniques and thus contributing to increased productivity of the economy?"¹⁸³ How to determine the technological progressiveness criterion of performance in an industry is difficult. Bain states several ways we should evaluate the technological progressiveness of an industry.

This is by simple enumeration and comparison of the number and importance of inventions and innovations made over a certain time period in various different industries, or by measuring 'inventive effort' in terms of a gross count of 'research and development' expenditures and personnel.¹⁸⁴

To examine technological progressiveness in the Bell System, we must look at the Bell Telephone Laboratories - the research and development arm of the Bell System.

BTL provides research and fundamental development, specific design and development of telecommunications technology and products, technical support to the BOC's and AT&T, development of business information systems programs for the BOC's and work associated with Western Electric military contracts.¹⁸⁵ (Note: BTL undertakes military contracts only if asked by the federal government and only on the

contracts for which it has unique qualifications.) The ownership of BTL is split 50-50 between AT&T and Western Electric. However, Western Electric, through the years, has invested more money in BTL for research and development than AT&T; consequently by 1972 Western's investment in BTL represented 70% of the total investment.¹⁸⁶ Today, BTL's budget is over 2/3 of a billion dollars and it employs over 17,000 people. Beverly C. Moore, Jr. in an article "AT&T: The Phony Monopoly" argues the BTL has been lethargic in technological progressiveness because the Bell System invariably chooses more capital-intensive technology rather than more productive and progressive technology. For example:

. In the early 1960's when satellite communications became feasible, the Bell System wanted to put fifty satellites in a random orbit; this would require a huge capital investment in satellite and ground stations. At the same time, the aircraft industry and others were arguing for satellites with synchronous orbits. This would require far less capital.

. The Bell System is reluctant to introduce new technology until the old is fully amortized.

. The Bell System is "top-heavy" with capital expansion, i.e. assets three times greater than annual revenues.

. The Bell System's equipment proved to be technologically behind when exposed to the "market test."

The method of figuring the rate base and a proper rate of return forces the Bell System to act very conservative; the regulatory environment thus contributes directly to the problem of adequately measuring technological progressiveness. It is not enough to have invented the transistor in 1947; the authors agree, to some extent, with the unfavorable assessment of BTL's technological progressiveness by Moore. However, Bain states: "Each industry should be judged in terms of how well it did relative to what it was possible to do."¹⁸⁷ In view of this, BTL's technological progressiveness is not as unfavorable relative to its opportunities at the time. At this time a more meaningful appraisal of BTL is difficult; it may be enough to note technological progress whenever it occurs.

C. SELLING COSTS

Another aspect of an industry's performance consists of sales promotional expenses, i.e. advertisement, expenses incurred for product change and parts of the distributive service that have a sales promotion orientation. Bain defines selling cost as:

expenditures made by firms to stimulate the sales volume of their products in two general ways; by informing potential customers of the availability,

characteristics and prices of the products; and by inducing or persuading them to buy.¹⁸⁸

Most economists accept, as necessary to efficient market performance, advertising which provides basic product information to buyers, expenditures on personal selling sufficient to satisfy needed information for the buyer, basic expenses for physical distribution of products, and the incorporation of functional changes in product design. Any expenditures above these basic levels is considered wasteful; increased costs which do not increase industry output are considered wasteful of society's resources and are therefore undesirable. One of the problems encountered in this area is measuring selling costs; no one has satisfactorily defined what should be considered an acceptable level of selling costs.

The Bell System's total advertising expense was \$78.6 million in 1972, \$85.5 million in 1973 and \$88.9 million in 1974.¹⁸⁹ (Calendar year dollars.) One of the concerns of the FCC, is the treatment of advertising expense for rate-making purposes. In Docket No. 19129, the FCC found a lack of uniform and adequate definitions in Bell's method of classifying advertising expenses. They also found advertising expenses were merged for monopoly and competitive service offerings (as mentioned in Chapter Four, this is an

example of cross-subsidation).¹⁹⁰ It is Bell's contention that all advertisements "...provide a contribution to the rest of the business, and the whole business benefits from those sales."¹⁹¹ This results in selling expenses promoting the Bell System being charged in part to the general rate payer on the grounds that it is part of the overall operation of the business. The FCC states that this:

does not provide an adequate basis for determining what should or should not be the burden of the user of interstate telephone services, nor are they adequate reasons for the continued promotion of services which use an ever-growing amount of natural resources and capital.¹⁹²

Beverly Moore cites the following situation of excessive selling costs in the Bell System:

...a public interest group with meager resources, the Independent Voters of Illinois (IVI), turned up numerous questionable practices of the Illinois Bell Telephone Company. Nearly \$10 million had been spent on advertising and public relations. If this level of advertising per potential customer were projected nationwide, IVI's expert testified, Illinois Bell would rank as the twelfth largest advertiser in the nation. Yet most of the advertising was aimed not at providing useful information to customers but purchasing their good will to make them less resistant to rate increases. This was evidenced by the grossly wasteful and inefficient manner in which the advertising monies were spent. For example, ads were aired on television to viewers who had probably seen the same ads in a newspaper. Other television ads, suggesting that the viewer send for a copy of a free booklet, 'How to Save Money on Long Distance,' produced 23 responses at an advertising cost of \$325 per response.¹⁹³

This raises serious questions of excessive selling costs in the Bell Operating Companies.

The authors believe the academia program sponsored by Bell System can be considered as an excessive selling cost. It is an attempt by Bell to favorably involve the academic community with the telephone industry. Its benefits to the rate payer cannot be measured against its cost because "...its results are a matter of Bell's judgment and its overall cost is not readily available."¹⁹⁴

The Bell System also makes contributions to charitable and community welfare organizations. Contributions in 1974 were well over \$16 million. The Bell System contends these contributions sustain economic and social viability of the thousands of communities in which bell operates and "...contribute significantly to lowering our costs to the subscriber."¹⁹⁵ The authors agree with the preliminary findings of the FCC that there is no evidence that validates this assertion. From the above discussion, it is concluded that selling costs by the Bell System may be excessive, and further study in this area is recommended.

D. TECHNICAL EFFICIENCY

Industry performance in the dimension of technical efficiency encompasses an appraisal of how closely an

industry approaches the goal of supplying whatever output it produces at the lowest attainable unit production costs. Bain lists three criteria in determining the technical efficiency of an industry:

- (1) The extent to which the firms in an industry and their plants attain or closely approach optimal scales-or the proportion of industry output that is supplied by plants and firms of at least approximately optimal scale.
- (2) The extent to which these firms and their plants attain or closely approach optimal degrees of vertical integration of successive processes or functions.
- (3) The extent to which the firms attain or closely approach the most efficient rates of utilization of their plant facilities - in effect, the extent, if any, of 'chronic' excess capacity in the industry.¹⁹⁶

Examining the performance of technical efficiency of the Bell System presents several difficulties. The first problem is the diversification of the Bell System; it is involved in equipment manufacturing, research and development and operation and maintenance of the telephone networks throughout the United States. A second problem is the enormous size of the Bell System; the sheer volume of data presented to the FCC in tariff filings each year alone is awesome. A third problem (which is significant in all aspects of performance) is the bookkeeping methods employed by the Bell System.

The Uniform System of Accounts (USOA) was prescribed by the FCC for telephone companies in 1935 and adopted in the same year by the Bell System. Since then, there has been no major revision of the USOA although the industry has undergone dramatic changes. The fundamental drawback of the USOA method is the non-availability of specific information by service. For instance, there is no informational breakdown of maintenance costs by type of equipment, cost of equipment by types of service (e.g. WATS, TELPAK) or experienced costs within a service offering (e.g. residential vs. business MTS). This poses substantial difficulties in any analysis.

A fourth problem, mentioned previously, is the regulatory climate. In particular the method of determining the rate base has had a substantial impact on technical efficiency; like technological progressiveness, both the state and federal regulatories must share in the performance of technical efficiency. Because of the above difficulties and also time constraints, the authors were unable to analyze the three criteria suggested by Bain to any great depth; therefore we will briefly comment only on certain areas within the Bell System.

The Bell System's construction budget currently approaches \$10 billion. The telephone subscriber pays (ultimately) for

capital expenditure although investors provide the dollars used to build plant and equipment. The FCC has found that Bell does not have any standards by which the magnitude of its construction budget is determined. The only standard apparent is that of Bell's "Fair Share Plan" which sets forth the minimum earnings (rate of return) which an operating company should have in order to maintain construction expenditures at high levels.¹⁹⁷ Further study of whether this doctrine of "perpetual growth" is technically efficient is recommended.

The Bell System contends that investment in toll network trunk facilities is adequate, essential and prudent; however in 1972 the FCC determined that Bell had an excess number of trunks representing a wasted investment of \$305.7 million. In examining the third criteria of technical efficiency, the authors support Bain's position that somewhat larger capacities are justified as being "most efficient." However, in the case of the Bell System, under-utilization of existing facilities is a way to expand the rate base. Peak telephone usage, historically, has been in the business hours; at other times the Bell facilities are idle. Instead of having excess trunks, which is costly, the authors feel the Bell System could reduce rates for calls made during the idle periods. This strategy of "peak load pricing" creates an

economic incentive for the user to place his call during off-peak hours. The Bell System has instituted lower rates for night and weekends long-distance calls but we believe these are only token advances.

AT&T's General Department acts as the coordinator and nerve center of the Bell System. The FCC found numerous waste and inefficiency of this department.¹⁹⁸ There was a pervasive lack of effective communications with other Bell entities, serious lags in decision-making, inefficient utilization of General Department personnel and lapses in budget and cost controls.¹⁹⁹ A team of top executives who studied the Bell license contract arrangement stated:

Under current conditions, where change is occurring at an ever accelerating rate, the complexity and size of the Bell System appears to be a handicap to the decision process.²⁰⁰

The question which needs further study is: whether the Bell System would be more technically efficient if it was not so "vertically concentrated?"

E. ALLOCATIVE EFFICIENCY

Allocative efficiency as defined by Bain, "concerns essentially the rate of output of the industry, or the amount of scarce productive resources allocated to producing its output - relative to the outputs produced and resources committed in other industries."²⁰¹ According to the theory

of pure competition, the economy will attain its greatest output when the profit rate realized by each industry in the economy is equal; that is, when a shift of resources from one industry to another would not result in any increase in the economy's total output.²⁰² (Allocative efficiency has a couple of inherent difficulties which make it debatable as a satisfactory criterion in measuring performance. The definition of costs and profits is extremely difficult in highly complex industries. A second problem stems from the fact that allocative efficiency is not attained in one industry alone, but requires economy-wide adherence to optimum conditions. This is often referred to the "second best" problem.) To measure allocative efficiency, average profit rates, both on sales and on owners equity, in various industries need to be examined and compared. (There is an assumption which is often overlooked, that is, risks encountered must be equal in nature for any type of comparison.) As mentioned above, optimal resource allocation assumes that companies in each industry earn no more and no less than a "normal" profit rate on the owners' investment in the industry. (A "normal" profit rate is the return that would be earned from alternate investments in the capital market, i.e. going interest rate plus a risk premium.)

Various marketing agencies give an intricate breakdown of the financial picture of the telecommunications industry (both Standard & Poors and Moody's Utilities do an excellent job). However, the authors want to know how well this industry "stacks up" against other industries. The "29th Annual Report on American Industry" in FORBES, 1 January 1977, provided the information needed. The following definitions are taken from this report:

Return on Stockholders Equity:

Companies obtain their capital from two sources: stockholders and creditors. Return on Stockholders' Equity is the percentage return on the stockholders' portion of the capital. We express earnings per common share (primary basis) as a percentage of the stockholders' equity per share (assuming conversion of all convertible preferreds) at the start of the year. The five year return in the following table is the average of the returns calculated for the years 1972-1975 and the 12-month period ending with the most recent quarterly report. (For those companies whose fiscal years end in January, February or March, the years 1973-1976 are used in place of 1972-75.)

Return on Total Capital:

This figure is the percentage return on a combination of stockholders' equity (both common and preferred) plus capital from long-term debt (including current maturities), minority stockholders' equity in consolidated subsidiaries and accumulated deferred taxes and investment tax credits. The profit figure used in this computation is the sum of net income, minority interests in net income and estimated aftertax interest paid on long-term debt--in other words, income before charges (primarily,

interest payments on long-term debt) relating to the nonequity portion of the capital.

The Return on Total Capital is a "basic" measure of an enterprise's profitability. It does not reflect - as the Return on Stockholders' Equity does - the effects of financing decisions upon profitability. For companies that derive all of their capital from common equity, the two profitability measures would, of course, be identical. But a company that employs debt wisely can thereby boost its Return on Stockholders' Equity well above its Return on Total Capital. The time periods employed for this calculation are the same as for Return on Stockholders' Equity.

Debt-To-Equity Ratio:

The Debt/Equity Ratio tells us to what extent management is using borrowed funds (leverage) in an attempt to upgrade profitability. It is calculated as of the end of the last reported fiscal year by dividing long-term debt (including current maturities) by the sum of stockholders' equity, minority stockholders' interests and accumulated deferred taxes and investment tax credits. A high debt/equity ratio makes earnings more volatile and is usually considered prudent only in relatively stable industries.

Net Profit Margin:

The Net Profit Margin gives a view of profits different from either the Return on Stockholders' Equity or the Return on Total Capital. Calculated by dividing net profits for the latest 12 months by net sales, it reveals what percentage of each dollar of revenue is available for payment of dividends and reinvestment in the business. Net profit margins vary widely from industry to industry.

Sales Growth:

This is a bit tricky. To even out shortrun distortions caused by very poor or very good years, we reach back over ten years to measure five-year Sales Growth. We take the average sales for the most recent five years (1972 through the latest 12 months) and compute the percentage change from average sales for the

preceding five years 1967-1971). We then express that change in terms of a five-year compounded annual rate of growth, since the midpoints of the two periods are five years apart.

Earnings-Per-Share Growth:

As with Sales Growth we go back ten years to calculate the five year rate of Earnings-Per-Share Growth. Using primary earning per share, we compare those for the most recent five years against those for the preceding five years and express the change in terms of a five-year compounded annual growth rate.

Table 5-1 shows the financial breakdown of the four largest telephone companies (as mentioned earlier, they account for over 97% of all business in the industry). Their profitability is measured in terms of stockholders equity and total capital. Their growth is measured in both sales and earnings. Stock market performance, debt/equity ratios and net profit margins are also included. Using these measures a company can be compared against other companies in its own industry and against all 962 other companies reported by FORBES. Finally, the major industry groups themselves are compared against one another. Although the telecommunications industry is monopolistic, they appear to be allocatively efficient. The regulation of the industry may account for this performance in allocative efficiency. Further study is needed, particularly of other regulated industries, to determine whether this is true. (Also, a statistical analysis of

	PROFITABILITY				RETURN ON CAPITAL				GROWTH			
	RETURN ON EQUITY		Debt/ Equity Ratio		Latest 12 mos.		5-Yr Rank		SALES		EARNINGS SHARE	
	5-Yr Avg	5-Yr Rank	Latest 12 mos.	Equity Ratio	Latest 12 mos.	5-Yr Rank	5-Yr Avg	Net Profit Margin	5-Yr Avg	5-Yr Rank	5-Yr Avg	5-Yr Rank
United Telecom	15.3%	1	16.7%	1.3	6.9%	1	6.4%	10.2%	16.4%	1	6.0%	1
General Tel & Elec	12.6	2	13.8	1.2	6.5	3	6.1	6.6	11.4	3	4.7	3
Continental Tel	12.6	3	11.8	1.4	5.5	4	5.7	9.9	14.3	2	3.7	4
American Tel & Tel	10.3	4	10.9	0.9	6.1	2	6.4	11.4	10.9	4	5.5	2
Medians	12.4		11.4	1.2	6.3		6.3	10.3	11.9		5.1	
Industry Medians	11.4		11.8	1.1	5.9		6.0	11.7	14.4		3.1	
All Industry Medians	12.7		12.9	0.4	9.8		9.1	4.6	11.8		9.4	

Source: FORBES, 1 January 1977

Table 5-1

the data presented needs to be undertaken to determine the significance of the per cent spreads between major industrial groupings.) The financial performance of the telephone sector has been, overall, outstanding. Standard and Poor's Industry Analysis, December, 1976, points to a positive and favorable future. However, in examining the Bell System as a separate entity, the FCC has argued that Western Electric's performance has been allocatively inefficient; Western Electric has earned excess profits because it's risk in the vertically integrated system is indistinguishable from that of the operating companies. (Western Electric enjoys a privileged market position.) Further study is needed in this area before any definite conclusions concerning allocative efficiency can be drawn.

F. FULL EMPLOYMENT AND INCOME DISTRIBUTION

Any meaningful discussion of how the domestic telecommunications industry affects full employment and income distribution is beyond the scope of this thesis. A few brief comments on these two areas will, hopefully, show how complex these areas can be.

Caves offers two hypotheses which are contradictory concerning full employment:

- (1) Monopolists being more sure of their market and subject to less uncertainty might maintain a more suitable rate of investment over time.²⁰³

- (2) The rigid prices which are observed in some types of oligopolies make employment fluctuate more over the business cycle than it would if these prices were flexible.²⁰⁴

No study has shown conclusively either of these hypotheses to be true. In fact, defining what is meant by "full" employment is a question "hotly" debated among economists. Caves' statement concerning full employment and price stability is pertinent to the telecommunications industry:

With regard to achieving full employment without inflation, we have little evidence that concentration or other dimensions of market structure affect the stability of output and employment in the economy. The pricing practices used in concentrated industries, however, make it harder to use public policy to maintain full employment without inflation.

The manner of income distribution has been a major concern to welfare economists. It is a complex subject; relatively strong theoretical arguments have been presented but the empirical evidence is weak. The theoretical argument which attempts to link industry structure to this dimension of performance is: "To the extent that highly concentrated industries tend to earn excess profits and to the degree that ownership is likewise concentrated high monopoly incomes will be obtained by a few people."²⁰⁵ To some advocates, equitable income distribution relates to "smallness." The concern of some people according to Caves:

...lies not with the distribution of income, but the distribution of the size of business firms themselves. They feel ours would be a better society if all businesses were small, if the maximum number of citizens were independent proprietors rather than employees serving the economic interest of an employee. They oppose monopoly, but even if all industries were competitive enough to give the best possible market performance, they would still like to dismantel any remaining businesses which were large by some absolute standard.²⁰⁶

Again, Caves states: "Economists prefer to leave policy toward income distribution to the field of taxation which is much better equipped to deal with it directly."²⁰⁷

VI. THE DEPARTMENT OF DEFENSE AS A CONSUMER

The Department of Defense (DOD) is a major consumer of services and facilities offered by the firms comprising the domestic telecommunications industry. According to the most recent listing of companies doing the largest dollar volume of business with the DOD, AT&T ranked seventeenth, with sales of \$447 million, and GT&E ranked thirty-ninth, with sales of \$189.7 million.²⁰⁸ Clearly, DOD annually requires a sizable amount of telecommunications services and facilities, procured commercially, in the performance of its missions. (The telecommunications services and facilities mentioned in this analysis refer to those of a generally commercial nature and not the highly sophisticated military tactical communications systems or command and control systems.) It should be noted that smaller firms in the industry, including SCC's, VAN's, and DSC's, provide a small percentage of these requirements but as noted above, AT&T and GT&E provide the vast majority.

The relationship of DOD to the firms in the telecommunications industry has not been without impact on the disbursement of contracts. Two illustrations which follow will demonstrate the close ties with the established common

carriers which DOD has developed since its inception in 1947, and which have contributed to the large business done by the established common carriers with DOD.

The antitrust suit filed against AT&T in 1949 by the Department of Justice was terminated in 1956 by a consent decree, details of which were cited in Chapter Two. However, DOD's relationship with AT&T had a profound influence on the eventual outcome of the suit.

The interplay of several forces doomed the lofty public interest objectives of the litigation. The Government's desire for AT&T to take over management of the trouble-plagued Sandia Laboratory, which was attempting to manufacture atomic bombs in the beginning of the cold war period, had a fatal effect on the lawsuit. The Sandia project was in such disarray that the Bell System was considered one of the few organizations capable of directing the complex scientific and technological manufacturing process. Management of Sandia was undertaken by the Sandia Corporation, a wholly owned, but non-profit, subsidiary of Western Electric. AT&T took every opportunity to note that Western must remain part of the Bell System if the crucial national security goal was to be achieved. Essentially, Bell held the production of atomic weapons as a hostage in its legal battles with the Antitrust Division.²⁰⁹

Attorney General Herbert Brownell, taking office in 1953, did not favor the numerous antitrust suits he had inherited from the Truman Administration and thus undertook private discussions with AT&T. Bell officials constantly emphasized the importance of an integrated Bell System to national defense, noting not only the Sandia effort but

Western Electric's leading role in the various Nike missile projects and the "DEW Line" radar systems.²¹⁰ Thus DOD, in relying upon AT&T for such vital national security projects, had become AT&T's ally in its antitrust suit and the knot had been joined for a close business relationship continuing until the present.

The second illustration is of the Armed Forces Communications and Electronics Association (AFCEA), a relationship which represents the voluntary symbiosis of the military establishment and the communications, as well as electronics, industries.²¹¹ Founded in 1946, AFCEA is dedicated, in its own words, "to the military-civilian partnership concept." This alliance of industrial and military leadership draws from the higher echelons of each and has "fashioned a community of interest so closely interwoven that whatever affects the progress of one partner is reflected in the progress of the other."²¹² Today, the officers and directors of AFCEA drawn from industry predominately represent the established common carriers, such as AT&T, GT&E, the remaining large ITC's, Western Union, and finally the manufacturing arm of AT&T - Western Electric. Given these two preceding examples, the DOD inclination toward these carriers, in relation to the smaller telecommunications firms, is great

indeed even with a concerted effort by DOD to be truly competitive in its procurement practices.

A. SERVICES/FACILITIES CONTRACTED

For purposes of this discussion, a distinction should be made between services and facilities. As delineated in an Arthur D. Little Inc. study on Competitive Acquisition of Telecommunications by the Federal Government, a service procurement places responsibility for system design, installation, maintenance, and operation with the contractor who owns and provides the facilities. In a facilities procurement, those responsibilities rest with the procurer; either as placed upon the procurer's own staff or upon a contractor selected by the procurer to undertake the responsibilities.²¹³ As an example, DOD's AUTODIN II is a service procurement with Western Union providing total resources and assuming responsibility whereas a facilities procurement might be evidenced by the Defense Communications Agency's (DCA) procurement of an individual AUTOVON circuit from the Joint-TELPAC pool: DCA is responsible for the system operation employing the additional circuit and has previously selected AT&T and several ITC's as contractors responsible for the system operation and maintenance of AUTOVON.

B. CONDITIONS UNDER WHICH CONTRACTED

Present procurement policies of DOD, in the procurement of telecommunications services and facilities of a generally commercial nature, set forth competitive bidding as the recommended procedure. However several factors tend to diminish the promise of this goal: (1) a certain overhead in preparing statements of work for competitive bidding is involved which is greater than that involved with a negotiated or sole source procurement under conditions as set forth in the Armed Forces Procurement Regulations (ASPR); and (2) the close rapport between DOD and the established common carriers weighs heavily toward AT&T and Western Union claiming the majority of commercial telecommunications contracts let. SCC's and DSC's do have minor contractual services with DOD but it is only a recent happening; "(they) are only now beginning to become involved in providing telecommunications services....They have the facilities and tariffed services to participate more extensively in the Government market, however."²¹⁴ In actuality, approximately 99 per cent of the government circuits leased from common carriers for both common-user and dedicated networks are routed on Joint-TELPAC, which is provided by AT&T and Western Union.²¹⁵ Due to the recent FCC decision in the Private Line Rate Case, FCC Docket 18128, however, AT&T and

Western Union will have to refile their TELPAK tariffs and it remains to be seen if significant inroads are made by SCC's, VAN's, and DSC's in providing services and facilities to DOD.

As documented in the Arthur D. Little Inc. study mentioned previously, it is generally apparent that the established common carriers have dominated DOD's procurement of commercially available telecommunications services and facilities. A final comment should be added to understand the dilemma confronting DOD in exercising competitive acquisition of its required services. The acquisition of telecommunications facilities, from possibly numerous vendors, rather than the acquisition of telecommunications services, from usually a single vendor, might potentially result in excessive fragmentation, which is defined as the leasing or purchasing of different portions of the facilities or equipment needed to provide an overall telecommunications service from various vendors.²¹⁶ Clearly, fragmentation can result in additional burdens for DOD since more system planning, design, maintenance and operation are involved than in a service procurement. But the Catch-22 is that the established common carriers (AT&T, major ITC's, and Western Union) are essentially the only vendors capable of providing a total telecommunications service to DOD.

C. ALTERNATE PURCHASING ENVIRONMENTS

If the above description is taken as the present state of telecommunications procurement by DOD, then several alternatives present themselves if it is also accepted that present procurement practices can be improved. That the government considers this the case can be seen in the issuance of two circulars relating to future procurement policies in the federal government. The Office of Management and the Budget (OMB) Circular A-76 and the Office of Telecommunications Policy (OTP) Circular 13 both concern the fundamental requirement to provide telecommunications service for the federal government at the "highest possible level of operating reliability, with optimum efficiency and lowest reasonable cost, and with maximum dependence on the private sector of the U.S. economy."²¹⁷ Thus in parallel with FCC rulings favoring competition in the private line service (PLS) and terminal equipment markets, OMB and OTP realize the operating efficiencies which would accrue to government agencies, in particular DOD, if competitive service and facilities procurements were the rule rather than the exception.

Implementation is the difficult part however, since SCC's, VAN's, DSC's and IC's cannot compete favorably with the established common carriers for service procurements. On the other hand, they can compete favorably on facilities

procurements. Thus OMB A-76 and OTP 13 place DOD in a basic quandry: whether to emphasize service over facilities procurements or vice versa?

DOD is consequently faced with a situation unique to most consumers: a real and significant opportunity to effect the development of the telecommunications industry in the near future, since it currently is and will continue to be a primary user of the industry's services and facilities. In effect, DOD by itself has sufficient leverage to enforce the executive branch of the government's (FCC, OTP, Department of Justice) decisions regarding competition within the PLS and terminal equipment markets, and possibly in additional markets. Procurement of facilities from firms other than the established common carriers will likely further the direction of the FCC's recent decisions and promote more viable PLS and terminal equipment markets. As a corollary, it probably will provide added impetus to innovative telecommunications technology so crucial to DOD. Yet the price of "sponsorship" of the facilities approach - the more competitive avenue - is high system overhead manifested in fragmentation.

Thus the ubiquitous DOD "tradeoff" ensues. The authors believe the problem is indeed substantial and the approach

decided upon by DOD will have a profound impact on the telecommunications industry. DOD's careful and reasoned response is therefore awaited.

VII. FINAL THOUGHTS AND POLICY OPTIONS

This thesis effort has covered much ground to this point. An historical overview of the domestic telecommunications industry has been presented; the structure, conduct, and performance of the industry were examined and the relationship between the Department of Defense and the industry was described. In this final chapter, future trends in the telecommunications industry are posited and the public policy options which will determine the structure, conduct, and performance of the industry in years ahead are briefly examined.

Today, the United States economy is the largest producer of goods and services in the world. Economic forecasts by the U.S. Bureau of Labor Statistics project that the nation's economy will experience continued growth in the next decade. The domestic telecommunications industry is expected to play a vital role in this continued growth. In fact, some economists predict that a new industry is emerging now -- the "information transfer industry." In this new industry, knowledge is the strategic resource rather than raw materials, and information, its formation and transmittal, will be the critical transforming source; the telecommunications industry

will be only one aspect of the "information transfer industry." Evidence of this new industry includes:

(1) Over 50 per cent of the U.S. workers are employed by the information sector of the economy. Table 7-1 projects the shift from goods to services on the basis of employment through 1980.²¹⁸

(2) Service exports have already overtaken goods in the mix of goods and services that we export abroad; in the next 20 years the gap is expected to widen.²¹⁹

(3) Indications of this new industry can be seen in:

- * How we produce
- * How we transact business
- * How we pay
- * How we are billed
- * How news is gathered and spread
- * How we communicate.

The "information transfer industry" will effect the entire spectrum of the economy and not be restricted to only the computer and the telecommunications industries; diverse industries such as banking, manufacturing, insurance, and education will be effected. Dependence upon information and its transmittal will be crucial. The questions of what and how information services are provided, who provides them and at what price, need to be addressed at this time by the Federal Government.

Table 7-1

Sector Distribution of Employment by Goods and Services, 1968
Projected to 1980 (in thousands)

	1968	1980	PERCENTAGE CHANGE 1968 - 1980
TOTAL	80,780	99,600	23
GOODS-PRODUCING TOTAL	28,975	31,600	9
Agriculture, forestry, and fisheries	4,150	3,180	(-23)
Mining	640	590	(-9)
Construction	4,050	5,480	35
Manufacturing	20,125	22,358	11
Durable	11,850	13,275	12
Non-durable	8,270	9,100	10
SERVICE-PRODUCING TOTAL	51,800	67,980	31
Transportation and utilities	4,500	5,000	10
Trade (Wholesale and retail)	16,600	20,500	23
Finance, insurance, and real estate	3,725	4,640	24
Services (personal, profes- sional, business)	15,000	21,000	40
Government	11,850	16,800	42
Federal	2,735	3,000	10
State and local	9,110	13,800	51

Source: The U.S. Economy in 1980, Bureau of Labor Statistics Bulletin 1673 (1970). The data for 1968 and 1980 are from Table A-16, p. 49.

Note: The figures for 1980 assume a 3 per cent unemployment. At a 4 per cent unemployment, there would be a drop in the labor force of one million (i.e. from 99,600 to 98,600), and this loss is distributed between goods-producing (31,600 to 31,000) and service-producing (67,980 to 67,300) employment. Figures are not always exact because of rounding.

Several forces are driving the economy in the direction of information services; however the dominant force is technological change, particularly in the fields of Large Scale Integration (LSI), terminal growth, computers, and communications. (The growth potential in the telecommunications industry is staggering; the Bell System is in the process of replacing all electromechanical toll switches with completely electronic, digital switching (ESS).) Bell predicts long distance usage to increase 150 per cent in 10 years.²²⁰ Satellite costs are continually declining. As AT&T noted in their 1976 Annual Stockholders Report, the innovation of light wave technology (fiber-optics) will greatly enhance the channel capacity in communication applications.)

The range of new information services also appears unlimited. The Institute of the Future identified several such services:

NEW COMMUNICATIONS SERVICES

1. Cashless Society Transactions:
Recording of financial transactions, with a hard-copy output for buyer and seller, a permanent record and updating of balance in computer memory.
2. Dedicated Newspaper:
A set of pages with printed and graphic information, possibly including photographs, the organization of which has been predetermined by the user to suit his preferences.

3. Computer-Aided School Instruction:
At the very minimum, computer determination of the day's assignment for each pupil, and at the end of the day, recording of the day's progress report. At its most complex, such a service would use a real time, interactive video color display with voice input and output and an appropriate program suited to each pupil's progress and temperament.
4. Shopping Transactions (Store Catalogs):
Interactive programs, perhaps video assisted, which describe or show goods at request of the buyer, advise him of the price, location, delivery time, etc.
5. Person-to-Person (Paid Work at Home):
Switched video and facsimile service substituting for normal day's contacts of middle-class managerial personnel where daily contacts are mostly of a routine nature. May also apply to contacts with the public by receptionist, doctor or his assistant, etc.
6. Plays and Movies from a Video Library:
Selection of all plays and movies. Color and sound are required.
7. Computer Tutor:
From a library of self-help programs available, a computer, in an interactive mode, coaching the pupil (typically adult) in the chosen subject.
8. Message Recording:
Probably of currently available type but may include video memory (a patient showing doctor rash he has developed).
9. Secretarial Assistance:
Written or dictated letters typed by a remotely situated secretary.
10. Household Mail and Messages:
Letters and notes transmitted directly to or from the house by means of home facsimile machines.
11. Mass Mail and Direct Advertising Mail:
Higher output, larger size pages, color output may be necessary to attract the attention of the recipient -- otherwise similar to item 10 above.
12. Answering Services:
Storage of incoming messages or notes whom to call, possibly with computer logic recognizing emergency situations and diverting the call.

13. Grocery Price List, Information and Ordering:
Grocery price list providing up-to-the-minute, undated information about perishable foodstuffs. Video color display may be needed to allow selection of selected merchandise.
14. Access to Company Files:
Information in titles, coded for security; regularly updated files are available with cross references, indicating the code where detailed information is stored. Synthesis also may be available.
15. Fares and Ticket Reservations:
As provided by travel agencies now but more comprehensive and faster. Cheapest rates, information regarding the differences between carriers with respect to service, memos, etc., may be available.
16. Past and Forthcoming Events:
Events, dates of events, and their brief description; short previews of future theater plays; and recordings of past events.
17. Correspondence School:
Taped or live high school, university, and vocational courses available on request with an option either to audit or take for credit. Course would be on TV, paper support on facsimile.
18. Daily Calendar and Reminder about Appointments:
Prerecorded special appointments and regularly occurring appointments stored as a programmed reminder.
19. Computer-Assisted Meetings:
Participation of computer as a partner in a meeting, answering questions of fact, deriving correlations, and extrapolating trends.
20. Newspaper, Electronic, General:
Daily newspaper, possibly printed during the night, available in time for breakfast. Special editions following major news breaks.
21. Adult Evening Courses on TV:
Noninteractive, broadcast mode live courses on TV--wider choice of subjects than at present.
22. Banking Services:
Money Orders, transfers, advice.
23. Legal Information:
Directory of lawyers, computerized legal counseling giving precedents, rulings in similar cases,

describing jurisdiction of various courts and chances of successful suits in a particular area of litigation.

24. Special Sales Information:

Any sales within the distance specified by the user and for items specified by him will be "flashed" onto the home display unit.

25. Consumers' Advisory Service:

Equivalent of Consumer Reports, giving best buy, products rated "acceptable," etc.

26. Weather Bureau:

Country-wide, regional forecasts or special forecasts (for farmers, fishermen), hurricane and tornado warnings similar to current AAU special forecast service.

27. Bus, Train, and Air Scheduling:

Centrally available information with one number to call.

28. Restaurants:

Following a query for a type of restaurant (Japanese, for instance), reservations, menu, prices are shown. Displays of dishes, location of tables, may be included.

29. Library Access:

After an interactive "browsing" with a "librarian computer" and a quotation for the cost of hard copy facsimile or a slow scan video transmission, a book or a magazine is transmitted to the home.

30. Index, All Services, Served by the Home Terminal:

Includes prices or charges of the above, or available communications services.²²¹

Given this anticipated trend, coupled with the state of the industry as discussed herein, what public policy alternatives are available in the telecommunications industry?

One policy alternative would be maintenance of the pervasive government control, i.e., government regulation would continue. Walter Adams states:

The advocates of public regulation or public ownership hope simultaneously to ensure industrial efficiency and to avoid the abuses of private monopoly - not by the dissolution of monopoly but by its social control.²²²

Unfortunately, this has not really worked. Caves states:

Comparisons of the performance of public utilities in states with regulatory commissions to their performance in states without them have turned up very little difference in prices paid by consumers that could be imputed to the effect of regulation.²²³

In the telecommunications industry, regulation has not challenged nor inhibited holding company growth. Attempts to impose arms length bargaining within the holding companies has met with repeated failure. The Bell System's budget is larger than each of the fifty state's budgets and larger than the combined budget of the Federal Court System, the U.S. Congress, and all the Federal Regulatory Agencies. Can an industry possessed with this formidable power be held accountable for the exercise of that power by an agency (FCC) whose total budget is 8,000 times smaller?

A second alternative is a rejection of private monopoly and the promotion of vigorous competition within the general framework of the antitrust laws. Again, Walter Adams states:

The advocates for greater competition through vigorous antitrust enforcement reject both the Scylla of private monopoly and the Charydis of public ownership. Believing that the preservation of competitive free enterprise is both desirable and possible, they point out that this does not mean a return to the horse-and-buggy age nor a strict adherence to the

textbook theories of 'perfect' or 'pure' competition. What they advocate is a structural arrangement in private industry characterized by decentralized decision-making and 'effective' competition.²²⁴

The basic statement of Congressional communications policy objectives--Section 1 of the Communications Act of 1934--directs, in part, that communications services be made "...available, so far as possible, to all the people of the United States..." After a 100 year effort, with over 94 per cent of the nation's households having telephone service, it is fair to say that this goal has been achieved. This being so, it is now incumbent upon the telecommunications industry to make sure that "all the people" receive the "rapid, efficient...communication service" also mandated by Section 1. The FCC's recent decisions coupled with the Justice Department's decision to prosecute AT&T under the antitrust laws underscores the government's current thrust towards more competition in the industry.

The telephone companies (Bell and the ITC's) argue that existing communications policy recognizes that the optimal structure of the telecommunications industry is a "natural monopoly" which should provide all communications services. The telephone companies claim that recent FCC decisions allowing limited competition in the equipment and private line service markets violate this policy. They have

introduced the Consumer Communications Reform Act (CCRA) to reestablish their perceived position of dominance. Time constraints keep us from examining this bill in detail; however the authors believe it to be an unprecedented grab for monopoly power by the telephone companies. The authors feel competition does well what monopoly cannot do; it rewards the innovator, the responsive manager, the efficient supplier and it encourages diversity in ideas and innovation. As the country stands on the threshold of a new technological era, rather than a reaffirmation of monopoly, we need a reaffirmation of competition. Dr. Whitehead, former Director of OTP stated in 1974 before the Senate Subcommittee on Antitrust and Monopoly:

We in government should reaffirm that in the absence of compelling unusual circumstances our economy will be based on competition, and insist that that policy be pursued. If we modernize our Communications Act and our regulatory process to conform to that policy, we can expect that we will continue to have the finest telephone system in the world and will have, in addition, a host of diverse services available to those in industry and the public who want or need them.²²⁵

The authors subscribe generally to this latter public policy alternative of competition, promoted vigorously within the regulatory framework presently established. The competition in the terminal equipment and PLS markets has contributed greatly to higher quality service and increased

telecommunications innovation. As a next step, we believe the FCC should consider the implementation of the competitive bidding elements between supplier and user mandated for the DSC's, among the established common carriers and all interconnect equipment manufacturers, whether affiliated with the established common carriers or not.

APPENDIX A

RATE OF RETURN FORMULAE²²⁶

In prescribing carrier rates, both the FCC and state regulatory commissions begin by determining the amount of revenues a carrier should earn on all of its service offerings. In other words, services are initially considered in the aggregate, and the earnings and costs of each individual service are not addressed.

1. The Revenue Requirement

Effective regulation causes the regulated firm to operate at "cost," that is, in a manner such that revenues are just sufficient to cover reasonable operating expenses plus the cost of capital. In other words, a carrier is entitled to recover its legitimate business expenses plus a fair return on the property used in providing services to the public. This total dollar amount is the carrier's revenue requirement.

The formula used to calculate a carrier's overall revenue requirement may be described as follows:

$$R = E + (P-D)K$$

R is the annual revenue requirement.

E is the annual operating expense.

P is the property or plant used in producing the services.

D is the accumulated depreciation reserve.
(P-D) is the rate base for a carrier, i.e., the original cost of property less depreciation.
K is the rate of return which is derived from the costs to a carrier in securing capital.

Once the revenue requirement is determined, the carrier files tariffs for its service with rates designed to earn that allowable dollar amount of revenues.

2. Operating Expense

Under the broad classification of expenses used by telephone companies, maintenance, taxes, and depreciation are the three largest categories. Lesser amounts are recorded under tariff expenses, commercial expenses, marketing expenses and general office salaries and expenses. Expenses which are allowed by the regulatory commission as part of the revenue requirement are said to be incurred "above the line." Those expenses which are not allowed as a part of the revenue requirement are characterized as "below the line." For example, legal expenses incurred by the utility in seeking to get its rates increased are above the line. However, social club dues are generally considered to be below the line.

3. The Rate Base

The rate base consists of the net value of the property used and useful in providing the utility service. In

determining the rate base the Federal Communications Commission uses the original cost of the property as entered on the carrier's books in accordance with the Uniform System of Accounts. Similar procedures have been followed by most regulatory commissions since the Supreme Court's decision in the Hope Case of 1944 (FPC v. Hope Natural Gas Company, 320 U.S. 591).

Items such as land, buildings, switching machines, cables, poles, microwave radio towers, maintenance trucks, telephone instruments, etc. are evaluated in the rate base. Since the amount of return allowed (in dollars) is dependent upon the size of the rate base, it is sometimes claimed that the utility will seek to invest heavily and substitute capital for labor wherever possible. In particular, Averch and Johnson have performed an analysis which indicates that when the allowed rate of return is greater than the cost of capital, the regulated firm will seek to expand into additional regulated markets (that is, expand its rate base) even though it may be operating unprofitably in some of these areas (Harvey Averch and Leland Johnson, "The Firm under Regulatory Constraint," American Economic Review, volume 52, December 1962, pp. 1059, 1063).

4. Depreciation

Depreciation is an especially important category of expense in utility regulation, for the annual depreciation charge is an allowable operating expense, and the cumulated charges constitute the depreciation reserve, which is deducted from the gross value of the plant in determining the rate base. Because of the importance of this item, the service lives of various classes of plant, salvage values and rates of depreciation are strictly regulated in great detail by the regulatory authorities. The FCC uses straight line, average service life, group depreciation.

5. Cost of Capital or Rate of Return

A carrier is given an opportunity to earn a "fair" return on the value of the property which it employs for the convenience of the public (i.e., its rate base). This return contemplates compensation to the carrier and investors for capital invested in property, as well as compensation for risks involved in providing services. Under judicial precedents, a carrier is guaranteed an opportunity to earn a high enough return to maintain its credit standing, attract additional capital, and provide earnings comparable to companies having corresponding risks. Stated in simple terms, the allowable rate of return is the weighted average of the

cost of embedded debt capital and the cost of equity capital.

Thus, three factors are essential to its determination:

1. Cost of Embedded Debt - This is the interest a carrier must pay to service its outstanding bonds and loans.
2. Cost of Equity - The return that investors require in order to invest in a given company.
3. Capital Structure - This is the relationship of debt to equity in terms of the carrier's total cost of capital.

A carrier's rate of return may be expressed by the following formula:

$$(D)(P_d) + (E)(P_e) = \text{Rate of Return}$$

D is the cost of the embedded debt.

P_d is the proportion of total capital costs attributable to debt.

E is the cost of equity.

P_e is the proportion of total capital costs attributable to equity.

If there is general investor optimism about receiving high returns on utility stock, the price of the stock will rise and the cost of equity capital will fall. On the other hand, if the investors are pessimistic about the utility's prospects, the price of the stock will fall and the cost of equity capital will rise. In strictly financial terms, what is seemingly good for the utility's customers (low prices) is not good for the utility's stockholders if it means excessively low rates of return on equity. Thus, if prices are so low that the utility's earned rate of return is below

the cost of capital, investor expectations will deteriorate, the price of the stock will fall, and the utility will be financially weakened. On the other hand, if high prices yield a return exceeding the cost of capital, the consumer is being charged excessive rates.

6. Accounts and Reports

In order to maintain appropriate surveillance over carrier operating expenses, rate base and return, the regulatory commission prescribes the system of accounts to be maintained by the carriers and requires the submission of periodic financial and operating reports in accordance with explicit and detailed rules. Accounting rules set forth among other things, the kinds of outlays which are to be capitalized and amortized, as well as those which must be considered as current operating expenses. The reports contain details of the financial structure and security ownership of the regulated company, names and salaries of officers and directors, amounts of assets, liabilities, income, expenses, and detailed supporting schedules for these major item classifications. Generally, the States have adopted the FCC's System of Accounts.

FOOTNOTES

¹Borchardt, Kurt, Structure and Performance of the U.S. Communications Industry, p. 8.

²Ibid., p. 9.

³Adams, Walter and Gray, Horace M., Monopoly in America, p. 40.

⁴Kahn, Alfred E., The Economics of Regulation, p. 2.

⁵Ibid., p. 3.

⁶Ibid., p. 3.

⁷Smead, Elmer E., Governmental Regulation and Promotion of Business, p. 7.

⁸Garfield, Paul J., and Lovejoy, Wallace F., Public Utility Economics, p. 2.

⁹Phillips, Charles F., The Economics of Regulation, p. 641.

¹⁰Smead, Elmer E., op. cit., p. 347.

¹¹Phillips, Charles F., op. cit., p. 651.

¹²Irwin, Manley R., The Telecommunications Industry, p. 47, quoted from FCC, Report on the Investigation of the Telephone Industry in the United States, H.R. Doc. No. 340, 76th Congress, 1st Session, 1939.

¹³Phillips, Charles F., op. cit., p. 652, quoted from Barnes, Irston R., The Economics of Public Utility Regulation, F. S. Crofts & Co., New York, N.Y., 1942, p. 38.

¹⁴Garfield, Paul J. and Lovejoy, Wallace F., op. cit., p. 448.

¹⁵Phillips, Charles F., op. cit., p. 655, quoted from Bureau of the Census reports of 1902 and 1907.

¹⁶Garfield, Paul J. and Lovejoy, Wallace F., op. cit., p. 449.

¹⁷Phillips, Charles F., op. cit., p. 653.

¹⁸Borchardt, Kurt, op. cit., p. 25.

¹⁹Ibid., p. 25.

²⁰Phillips, Charles F., op. cit., p. 655.

²¹Borchardt, Kurt, op. cit., p. 24.

²²Phillips, Charles F., op. cit., p. 656, quoted from letter from E. K. Hall, vice president of AT&T, to F. B. MacKinnon, president of USITA, June 1922.

²³Phillips, Charles F., op. cit., p. 656.

²⁴Caves, Richard, American Industry: Structure, Conduct, Performance, p. 60.

²⁵Ibid., p. 61.

²⁶Smead, Elmer E., op. cit., p. 353.

²⁷The Communications Act of 1934, as amended, 50 Stat 189, Sec. 1.

²⁸FCC, Report on the Investigation of the Telephone Industry in the United States, op. cit., p. 596.

²⁹Borchardt, Kurt, op. cit., p. 28.

³⁰Caves, Richard, op. cit., p. 61.

³¹Ibid., p. 61.

³²Borchardt, Kurt, op. cit., p. 25.

³³Kahn, Alfred E., op. cit., p. 295, quoted from United States of America v. Western Electric Company, Inc. and American Telephone & Telegraph Company, Complaint, U.S. District Court, New Jersey, Civil Action No. 17-49, filed January 14, 1949, par. 59.

³⁴Ibid., p. 295-296, Complaint, par. 60.

³⁵Kahn, Alfred E., op. cit., p. 297.

³⁶Ibid., p. 297.

³⁷Ibid., p. 129.

³⁸FCC, In the Matter of Allocation of Frequencies in the Bands Above 890 MC, Memorandum Opinion and Order, 29FCC825 (1960)

³⁹Kahn, Alfred E., op. cit., p. 130.

⁴⁰Ibid., p. 133.

⁴¹Irwin, Manley R., op. cit., p. 97.

⁴²Ibid., p. 98, quoted from FCC, In the Matter of an Inquiry into the Administrative and Regulatory Problems Relating to the Authorization of Commercially Operable Space Communication Systems, Docket No. 14024, Notice of Inquiry, April 3, 1961.

⁴³Ibid., p. 101.

⁴⁴Phillips, Charles F., op. cit., p. 643-644.

⁴⁵Ibid., p. 644.

⁴⁶Borchardt, Kurt, op. cit., p. 27.

⁴⁷Ibid., p. 28.

⁴⁸Irwin, Manley R., "The Communications Industry," quoted from Adams, Walter (ed.), The Structure of American Industry, p. 393.

⁴⁹Ibid., p. 393.

⁵⁰Hush-A-Phone Corporation et. al. v. United States of America and Federal Communications Commission, et. al., 238 F.2d 266, 268 (1956)

⁵¹Kahn, Alfred E., op. cit., p. 141.

⁵²Borchardt, Kurt, op. cit., p. 33.

⁵³Stone, R. S., Schankerman, M. A., Fenton, C. G., Selective Competition in the Telephone Industry, p. 23.

⁵⁴Borchardt, Kurt, op. cit., p. 32.

⁵⁵Defense Communications Engineering Center, Technical Note No. 35-75, An Analysis of the Feasibility of Increased Dependence on Commercial Communications Satellites for Satisfying DOD Requirements, August 1975.

⁵⁶Loehwing, David A., "Ma Bell vs. IBM?", Barron's, p. 3, February 9, 1976.

⁵⁷Datamation, "News in Perspective," November 1976, p. 144.

⁵⁸Business Week, "A Rush of Actions Against Ma Bell," January 10, 1977, p. 26.

⁵⁹Holmes, Edith, "Justice Clarifies Issues in U.S. vs AT&T Antitrust Trial," Computerworld, January 10, 1977, p. 11.

⁶⁰Business Week, op. cit., p. 25.

⁶¹San Francisco Chronicle, "AT&T Antitrust Suit," January 27, 1977.

⁶²American Telephone & Telegraph, 1975 Statistical Report.

⁶³FCC, In the Matter of American Telephone and Telegraph Company and the Associated Bell System Companies, Charges for Interstate Telephone Service, Transmittal Nos. 10989, 11027, 11675 and 12303, Docket No. 19129, September 1, 1976, p. 9.

⁶⁴Time Magazine, "A Bill for Ma Bell," p. 78, October 4, 1976.

⁶⁵FCC, In the Matter of Economic Implications and Interrelationships Arising from Policies and Practices Relating to the Customers Interconnection Jurisdictional Separations and Rate Structures, Docket No. 20003, September 23, 1976, p. 32.

⁶⁶Bain, Joe S., Industrial Organization, p. 7.

⁶⁷Vernon, John M., Market Structure and Industrial Performance: A Review of Statistical Findings, p. 29.

⁶⁸Bain, Joe S., op. cit., p. 9.

⁶⁹FCC Docket No. 20003, op. cit., p. 35.

⁷⁰Blair, John M., Economic Concentration: Structure, Behavior and Public Policy, p. 25.

⁷¹FCC Docket No. 20003, op. cit., p. 34.

⁷²Cox, Kenneth A., Material Relating to the Testimony of Kenneth A. Cox, p. 533, quoted from Hearings Before the Subcommittee on Antitrust and Monopoly of the Committee on the Judiciary United States Senate, S. 1167, part 2, The Communications Industry, 93rd Congress, 1st Session, 1973.

⁷³Irwin, Manley R., quoted from FCC Docket No. 19129, (Phase II) In the Matter of American Telephone and Telegraph Company and the Associated Bell System Companies, Charges for Interstate Telephone Service, Transmittals Nos. 10989, 11027, 11657, 12303, Vol. 1, September 1976, p. 31.

⁷⁴Ibid., p. 32.

⁷⁵Docket No. 19129 (Phase II), Brief and Excerptions of the Common Causes Bureau's Trial Staff, p. 12.

⁷⁶Bain, Joe S., op. cit., p. 223.

⁷⁷FCC, Report by the FCC on Domestic Telecommunications Policies, September 27, 1976, Tab C, p. 14.

⁷⁸Ibid., p. 19.

⁷⁹Mertz, P. and Mitchell, D., "Transmission Aspects of Data Transmission Service Using Private Line Voice Telephone Channels," Bell System Technical Journal, Nov., 1957, p. 1451 quoted from Report by the FCC on Domestic Telecommunications, op. cit., p. 22.

⁸⁰FCC, Report by the FCC on Domestic Telecommunications, op. cit., p. 67.

⁸¹Nelson, James R., "The Role of Competition in Regulated Industries," The Antitrust Bulletin 1,3 (Jan-Apr, 1966) quoted from Phillips, Charles F., op. cit., p. 19.

⁸²Arthur D. Little Inc., A Study of Competitive Acquisition of Telecommunications by the Federal Government, May 1976, p. A-35.

⁸³Landon, John H., "Changing Technology and Optional Industrial Structure," quoted from Gold, Bela (ed.) Technological Change: Economics, Management and Environment, p. 108.

⁸⁴Caves, Richard, op. cit., p. 29.

⁸⁵FCC, Report by the FCC on Domestic Telecommunication Policies, op. cit., p. 5.

⁸⁶Irwin, Manley R., "The Communications Industry," op. cit., p. 5.

⁸⁷Caves, Richard, op. cit., p. 18.

⁸⁸Phillips, Charles F., op. cit., p. 5.

⁸⁹McKie, James W., "Public Utility Regulation: Structure and Performance" from Russell, Milton (ed.) Perspectives in Public Regulation, p. 85.

⁹⁰FCC Docket No. 20003, op. cit., p. 40.

⁹¹Ibid., p. 40.

⁹²Ibid., p. 43.

⁹³Ibid., p. 43.

⁹⁴Ibid., p. 44

⁹⁵Ibid., p. 48

⁹⁶Ibid., p. 49

⁹⁷Caves, Richard, op. cit., p. 37.

⁹⁸Steichen, Terril J., "Competition and the Computer/Communications Convergence," Government Data Systems, July/August 1976, p. 26.

⁹⁹FCC, Computer Inquiry (Tentative Decision), 28 FCC 2nd 291 (1970)

¹⁰⁰FCC Docket No. 20828 (FCC 76 - 745), August 9, 1976.

¹⁰¹FCC, Docket No. 20003, op. cit., p. 19.

¹⁰²deButts, John D., "The Bell System's Position on Telecommunications Policy," National Policy and the Future of Telecommunications, AT&T, December 1976, p. 12.

¹⁰³FCC, Report by the Federal Communications Commission on Domestic Telecommunications Policies, op. cit.

¹⁰⁴Ibid., Tab D, p. 33.

¹⁰⁵Ibid, Tab C and D.

¹⁰⁶Stone, R. S., Schankerman, M. A., Fenton, C. G., Selective Competition in the Telephone Industry, T&E Inc., November 1976.

¹⁰⁷Hearings before the Subcommittee on Antitrust and Monopoly of the Committee on the Judiciary, U.S. Senate, 93rd Congress, First Session on S. 1167, Part 2, The Communications Industry, July 30, 31, August 1, 2, 1973.

¹⁰⁸Agenda for Oversight: Domestic Common Carrier Regulation, Subcommittee on Communications of the Committee on Interstate and Foreign Commerce, U.S. House of Representatives, 94th Congress, 2nd Session, April 26, 1976.

¹⁰⁹Arthur D. Little Inc., op. cit., May 1976.

¹¹⁰FCC, Report by the Federal Communications Commission on Domestic Telecommunications Policies, op. cit., Tab C., p. 14.

¹¹¹Ibid., p. 15.

¹¹²Ibid., p. 18.

113 Agenda for Oversight: Domestic Common Carrier Regulation, op. cit., p. 4.

114 Ibid., p. 4.

115 FCC, In the Matter of American Telephone & Telegraph Company, Long Lines Department, Revisions of Tariff FCC No. 260 Private Line Services, Series 5000 (TELPAC), Docket No. 18128, Memorandum Opinion and Order, September 23, 1976.

116 Arthur D. Little Inc., op. cit., p. A-7.

117 Agenda for Oversight: Domestic Common Carrier Regulation, op. cit., p. 15.

118 "How Carriers Compare in Service Cost and Coverage," Data Comm User, November 1976, p. 15.

119 "Datran - A Costly Marketing Lesson," Data Comm User, October 1976, p. 9.

120 "Maneuvering to Save Execunet," Datamation, October 1976, p. 146.

121 Agenda for Oversight: Domestic Common Carrier Regulation, op. city., p. 17.

122 FCC, Report by the Federal Communications Commission on Domestic Telecommunications Policies, op. cit., Tab D, p. 139.

123 Ibid., Tab D.

124 Ibid., p. 1-2.

125 Stone, R. S., et. al., op. cit., p. 21.

126 FCC, Report by the Federal Communications Commission on Domestic Telecommunications Policies, op. cit., Tab D, p. 141.

127 Ibid., Tab C, p. 30.

128 Ibid., p. 130.

129 Moore, Beverly C. Jr., "AT&T: The Phony Monopoly," The Monopoly Makers, Mark Green (ed.), p. 78.

¹³⁰Averch, Harvey and Johnson, Leland L., "Behavior of the Firm under Regulatory Constraint," American Economic Review, December 1962, Vol. 52, pp. 1052-1069.

¹³¹Kahn, Alfred E., op. cit., p. 50.

¹³²Baumol, William J. and Klevorick, Alvin K., "Input Choices and Rate-of-Return Regulation: An Overview of the Discussion," The Bell Journal of Economics and Management Science, vol. 1, No. 2, Autumn 1970, pp. 162-190.

¹³³Klevorick, Alvin K., "The Behavior of a Firm Subject to Stochastic Regulatory Review," The Bell Journal of Economics and Management Science, vol. 4, No. 1, Spring 1973, pp. 57-88.

¹³⁴Moore, Beverly C. Jr., op. cit., p. 78.

¹³⁵"Who Will Supply the Office of the Future," Business Week, 27 July 1974, p. 45.

¹³⁶Ibid., p. 45.

¹³⁷Ibid., p. 45.

¹³⁸Agenda for Oversight: Domestic Common Carrier Regulation, op. cit., p. 11.

¹³⁹Blazak, James, Assistant Chief FCC Common Carrier Bureau, telephone conversation with Richard W. Mayo, 8 February 1977.

¹⁴⁰Penn, Stanley, "Telephone Tizzy," Wall Street Journal, January 17 and 19, 1977.

¹⁴¹Stone, R. S., et. al., op. cit., p. 15.

¹⁴²deButts, John D., "Telephone Monopoly: Good or Bad?" U.S. News & World Report, November 22, 1976, p. 43.

¹⁴³"Earnings Increase Posted by AT&T," Monterey Peninsula Herald, November 30, 1976, p. 21.

¹⁴⁴"U.S. Still Talk Champ of World," Monterey Peninsula Herald, February 6, 1977.

¹⁴⁵deButts, John D., "Telephone Monopoly: Good or Bad?" op. cit., p. 44.

¹⁴⁶"Newspaper Reports AT&T Plans for Toll Charge System," Monterey Peninsula Herald, November 30, 1976, p. 21.

¹⁴⁷FCC, Docket 18128, op. cit.

¹⁴⁸Letter from James R. Billingsley (AT&T) to Richard E. Wiley (FCC), March 19, 1976, quoted in Agenda for Oversight: Domestic Common Carrier Regulation, op. cit., pp. 20-21.

¹⁴⁹FCC, Report by the Federal Communications Commission on Demestic Telecommunications Policies, op. cit., Tab C, pp. 147-148.

¹⁵⁰Irwin, Manley R., The Telecommunications Industry, p. 24.

¹⁵¹Moore, Beverly C. Jr., op. cit., p. 87.

¹⁵²Ibid., p. 87.

¹⁵³Hearings before the Committee on Government Operations, U.S. Senate, 93rd Congress, 2nd Session on S. 704, S. 770, S. 3604, S. 4155, S. 4167 and S.J. Res. 256, November 21, 22, 25, 1974, Part 1, p. 285.

¹⁵⁴Ibid., p. 284.

¹⁵⁵FCC, Telerent decision.

¹⁵⁶Irwin, Manley R., "The Communications Industry," op. cit., p. 383.

¹⁵⁷"Signalgram Briefs," Signal Magazine, January 1977, p. 26.

¹⁵⁸Covault, Craig, "TDRSS Won by Western Union," Aviation Week & Space Technology, January 3, 1977, p. 14.

¹⁵⁹Waverman, Leonard, "The Regulation of Telecommunications: Pandora's Telephone Box," Challenge, November-December 1976, p. 48.

¹⁶⁰Bain, Joe S., op. cit., p. 11.

¹⁶¹Caves, Richard, op. cit., p. 94.

¹⁶²Docket No. 19129, op. cit., p. 134.

¹⁶³Phillips, Charles F., op. cit., p. 5.

¹⁶⁴"FCC Reports AT&T Service is Excellent," Monterey Peninsula Herald, March 1, 1977, p. 2.

¹⁶⁵Bain, Joe S., op. cit., p. 421.

¹⁶⁶Docket No. 19129, op. cit., p. 36.

¹⁶⁷Ibid., p. 392.

¹⁶⁸Ibid., p. 399.

¹⁶⁹Ibid., p. 399.

¹⁷⁰Ibid., p. 37.

¹⁷¹Ibid., p. 392.

¹⁷²Ibid., p. 399.

¹⁷³Ibid., p. 483.

¹⁷⁴Ibid., p. 392.

¹⁷⁵Ibid., p. 393.

¹⁷⁶Ibid., p. 393.

¹⁷⁷Ibid., p. 505.

¹⁷⁸Ibid., p. 526.

¹⁷⁹Ibid., p. 395.

¹⁸⁰Ibid., p. 80.

¹⁸¹Ibid., p. 494.

¹⁸²Ibid., p. 45.

¹⁸³Bain, Joe S., op. cit., p. 419.

- ¹⁸⁴Ibid., p. 419.
- ¹⁸⁵Docket No. 19129, op. cit., p. 74.
- ¹⁸⁶Ibid., p. 76.
- ¹⁸⁷Bain, Joe S., op. cit., p. 420.
- ¹⁸⁸Ibid., p. 412.
- ¹⁸⁹Docket No. 19129, op. cit., p. 1101.
- ¹⁹⁰Ibid., p. 22.
- ¹⁹¹Ibid., p. 1105.
- ¹⁹²Ibid., p. 1106.
- ¹⁹³Moore, Beverly, op. cit., p. 82.
- ¹⁹⁴Docket No. 19129, op. cit., p. 1108.
- ¹⁹⁵Ibid., p. 1102.
- ¹⁹⁶Bain, Joe S., op. cit., p. 373-374.
- ¹⁹⁷Docket No. 19129, op. cit., p. 862.
- ¹⁹⁸Ibid., p. 48.
- ¹⁹⁹Ibid., p. 27.
- ²⁰⁰Ibid., p. 56.
- ²⁰¹Bain, Joe S., op. cit., p. 374.
- ²⁰²Grabner, John R., Competition in the Marketplace, p. 52.
- ²⁰³Caves, Richard, op. cit., p. 96.
- ²⁰⁴Ibid., p. 110.
- ²⁰⁵Grabner, John R., op. cit., p. 54.
- ²⁰⁶Caves, Richard, op. cit., p. 206.
- ²⁰⁷Ibid., p. 96.

²⁰⁸DOD, 100 Largest Defense Contractors and Their
Subsidiary Corporations FY 1976.

²⁰⁹Brooks, John, Telephone, The First Hundred Years, p. 252, referenced from ACCT, Competition in Telecommunications - An Historical Perspective, submitted to the Subcommittee on Communications of the Interstate and Foreign Commerce Committee of the U.S. House of Representatives, September 29, 1976, p. 70-71.

²¹⁰ACCT, op. cit., p. 71.

²¹¹Schiller, Herbert I., Mass Communications and American Empire, p. 59.

²¹²Sarnoff, David, Chairman-RCA Corporation, quoted in Schiller, op. cit., p. 57.

²¹³Arthur D. Little Inc., op. cit., p. 1-4.

²¹⁴Ibid., p. 3-8.

²¹⁵Ibid., p. 4-50

²¹⁶Ibid., p. 4-1.

²¹⁷Ibid., p. 1-1.

²¹⁸Irwin, Manley R., "Information Transfer and Public Policy: Competition or Nationalization," Interstate and Foreign Commerce Committee, Subcommittee on Communications House of Representatives, September 29, 1976, p. 3.

²¹⁹Ibid., p. 5.

²²⁰Ibid., p. 17.

²²¹Ibid., p. 20-22.

²²²Adams, Walter, "Public Policy in a Free Enterprise Economy," quoted from The Structure of American Industry, p. 485.

²²³Caves, Richard, op. cit., p. 69.

²²⁴Adams, Walter, op. cit., p. 485.

²²⁵Dr. Whitehead quoted from "Information Transfer and Public Policy: Competition or Nationalization," op. cit., p. 45.

²²⁶FCC Docket 20003, op. cit.

BIBLIOGRAPHY

A. BOOKS

- Adams, Walter (editor), The Structure of American Industry, The MacMillan Company, New York, N.Y., 1971.
- Adams, Walter, and Gray, Horace M., Monopoly in America, The Government as Promoter, The MacMillan Company, New York, N.Y., 1955.
- Agapos, A. M., Government-Industry and Defense: Economics and Administration, The University of Alabama Press, University of Alabama, 1975.
- Bain, Joe S., Industrial Organization, John Wiley & Sons, Inc., New York, N.Y., 1968.
- Blair, John M., Economic Concentration, Structure, Behavior and Public Policy, Harcourt Brace Jovanovich, Inc., New York, N.Y., 1972.
- Borchardt, Kurt, Structure and Performance of the U.S. Communications Industry, Harvard University, Boston, Massachusetts, 1970.
- Brock, Gerald W., The U.S. Computer Industry, A Study of Market Power, Ballinger Publishing Company, Cambridge, Massachusetts, 1975.
- Capron, William M. (editor), Technological Change in Regulated Industries, The Brookings Institution, Washington, D. C., 1971.
- Caves, Richard, American Industry: Structure, Conduct, Performance, Prentice-Hall, Inc., Englewood Cliffs, N.J., 1972.
- Galbraith, John K., The New Industrial State, Houghton Mifflin Company, Boston, Massachusetts, 1967.
- Garfield, Paul J., and Lovejoy, Wallace F., Public Utility Economics, Prentice-Hall, Inc., Englewood Cliffs, N.J., 1964.

- Gold, Fela (editor), Technological Change: Economics, Management and Environment, Pergamon Press, Oxford, 1975.
- Goldschmid, H. J., Mann, H. M., and Weston, J. F., Industrial Concentration: The New Learning, Little, Brown and Company, Boston, Massachusetts, 1974.
- Green, Mark J. (editor), The Monopoly Makers, Ralph Nader's Study Group Report on Regulation and Competition, Grossman Publishers, New York, N.Y., 1973.
- Green, Paul E. Jr. (editor), Computer Communications, IEEE Press, New York, N.Y., 1974.
- Hyde, J. Edward, The Phone Book, Henry Regnery Company, Chicago, Illinois, 1976.
- Irwin, Manley R., The Telecommunications Industry, Integration vs. Competition, Praeger Publishers, New York, N.Y., 1971.
- Kahn, Alfred E., The Economics of Regulation: Principles and Institutions, Vols. I and II, John Wiley & Sons, Inc., New York, N.Y., 1971.
- Kaysen, Carl and Turner, Donald F., Antitrust Policy, An Economic and Legal Analysis, Harvard University Press, Cambridge, Massachusetts, 1959.
- Liebhafsky, H. H., American Government and Business, John Wiley & Sons, Inc., New York, N.Y., 1971.
- Mansfield, Edwin (editor), Monopoly Power and Economic Performance, W. W. Norton & Company, Inc., New York, N.Y., 1968.
- Martin, James, Telecommunications and the Computer, Prentice-Hall, Inc., Englewood Cliffs, N.J., 1969.
- Mathison, Stuart L., and Walker, Phillip M., Computers and Telecommunications: Issues in Public Policy, Prentice-Hall, Inc., Englewood Cliffs, N.J., 1970.
- McDonald, John, The Game Business, Doubleday & Company, Inc., Garden City, N. Y. 1975.

- Mund, Vernon and Wolf, Ronald, Industrial Organization & Public Policy, Prentice-Hall, Inc., Englewood Cliffs, N. J., 1971.
- Pelton, Joseph N., Global Communications Satellite Policy: INTELSAT, Politics and Functionalism, Lomond Books, Mt. Airy, Maryland, 1974.
- Phillips, Almarin (editor), Promoting Competition in Regulated Markets, The Brookings Institution, Washington, D. C., 1975.
- Phillips, Charles F. Jr., The Economics of Regulation, Richard D. Irwin, Inc., Homewood, Illinois, 1969.
- Russel, Milton (editor), Perspectives in Public Regulation, Southern Illinois University Press, Carbondale, Illinois, 1972.
- Schiller, Herbert I., Mass Communications and American Empire, Augustus M. Kelley Publishers, New York, N. Y., 1969.
- Shepherd, William G., and Gies, Thomas G., Regulation in Further Perspective: The Little Engine that Might, Ballinger Publishing Company, Cambridge, Massachusetts, 1974.
- Stern, Louis W., and Grabner, John R. Jr., Competition in the Marketplace, Scott, Foreman and Company, Linville, Illinois, 1970.
- Shepherd, William G., and Gies, Thomas G., Utility Regulation, New Direction In Theories and Policy, Random House, New York, N.Y., 1966.
- Sherman, Roger, The Economics of Industry, Little Brown and Company, Boston, Massachusetts, 1974.
- Smead, Elmer E., Governmental Promotion and Regulation of Business, Meredith Corporation, New York, N.Y., 1969.
- Sobel, Robert, The Age of Giant Corporations: A Micro-economic History of American Business, 1914-1970, Greenwood Press, Westport, Connecticut, 1972.

- Trebing, Harry M. (editor), Essays On Public Utility Pricing and Regulation, MSU Institute of Public Utilities, East Lansing, Michigan, 1971
- Trebing, Harry M. (editor), Performance Under Regulation, MSU Institute of Public Utilities, East Lansing, Michigan, 1968.
- Ulmer, Melville J., Capital In Transportation, Communications, and Public Utilities: Its Formation and Financing, Princeton University Press, Princeton, N.J., 1960.
- Vernon, John M., Market Structure and Industrial Performance, A Review of Statistical Findings, Allyn and Bacon, Inc., Boston, Massachusetts, 1972.
- Weiss, Leonard W., and Strickland, Allyn D., Regulation: A Case Approach, McGraw-Hill Book Company, 1976.
- Yarnolinsky, Adam, The Military Establishment, Harper & Row, Publishers, Inc., New York, N.Y., 1971.

B. NEWSPAPERS/PERIODICALS

- Allen, Roger H., "On Line to Washington," Data Comm User, August 1976.
- Allen, Roger H., "On Line to Washington," Data Comm User, October 1976.
- Allen, Roger H., "On Line to Washington," Data Comm User, November 1976.
- Bazzy, William, "Conflict of Competitive Communications," Telecommunications, May 1976.
- Bell Telephone Magazine, "An Independent Point of View," November/December 1976.
- Bell Telephone Magazine, "The Government and Regulated Industries," November/December 1976.
- Bell Telephone Magazine, "Twelve Investment Pros Hand Ma Bell a Few Pluses and Minuses," September/October 1976.

Brennan, William E., "Rigid Economics and the Bell System," Bell Telephone Magazine, November/December 1976.

Burke, Richard, "Sen. Vance Hartke," Bell Telephone Magazine, September/October 1976.

Business Week, "A Rush of Actions Against Ma Bell," January 10, 1977.

Business Week, "A Whole New Way to Figure AT&T's Rates," February 14, 1977.

Business Week, "Is John Sherman's Antitrust Obsolete?", March 23, 1974.

Business Week, "Who Will Supply the Office of the Future," July 27, 1974.

Covault, Craig, "TDRSS Won by Western Union," Aviation Week & Space Technology, January 3, 1977.

Crosland, Edward B., "AT&T Position Statement," Telecommunications.

Data Comm User, "Bell Weighs Response to Order for Revised Service Tariffs," November 1976.

Data Comm User, "How Carriers Compare in Service Cost and Coverage," November 1976.

Datamation, "News in Perspective - Carriers," October 1976.

Datamation, "News in Perspective - Communications," October 1976.

Datamation, "News in Perspective - Communications," November 1976.

Datamation, "News in Perspective - Communications," December 1976.

Ferreira, Joseph and Nilles, Jack M., "Five-Year Planning for Data Communications," Datamation, October 1976.

Forbes, "The Forbes Yardsticks: 1976," January 1, 1977.

Fortune, "The Fifty Largest Utilities," July 1976.

Griesinger, Frank K., "Another Law for Your 'Protection'," Administrative Management, September 1976.

Griesinger, Frank K., "New PABX Systems: A Long Line of Useful Features," Administrative Management, November 1976.

Holmes, Edith, "Justice Clarifies Issues in U.S. vs. AT&T Antitrust Trial," Computerworld, January 10, 1977.

Loehwing, David A., "Computer Networks," Barron's, February 16, 1976.

Loehwing, David A., "Ma Bell vs. IBM?", Barrons's, February 9, 1976.

Louis, Arthur M., "John deButt's Long March from Trainee to Chairman," Fortune, December 1976.

McNitt, James R., "A Prescription for Progress," Signal Magazine, February 1976.

Monterey Peninsula Herald, "Designer Works on 'What's There'," December 11, 1976.

Monterey Peninsula Herald, "Directory Assistance to Cost Soon," December 12, 1976.

Monterey Peninsula Herald, "Earnings Increase Posted by AT&T," November 30, 1976.

Monterey Peninsula Herald, "FCC Reports AT&T Service is Excellent," March 1, 1977.

Monterey Peninsula Herald, "Newspaper Reports AT&T Plans for Toll Charge System," November 30, 1976.

Monterey Peninsula Herald, "U.S. Still Talk Champ of World," February 6, 1977.

Paschall, Lee M., "What We Get for Our DOD Telecommunications \$," Signal Magazine, January 1976.

Penn, Stanley, "Telephone Tizzy," Wall Street Journal, January 17 and 19, 1977.

Rockwell, James M., and Arbogast, Gordon W., "DCA Management of DOD Multiplex," Signal Magazine, September 1976.

Rowland, William C., "Changing Perspectives of the Communications Industry," Signal Magazine, November/December 1975.

San Francisco Chronicle, "AT&T Antitrust Suit," January 27, 1977.

San Francisco Chronicle, "IRS Accused of Letting AT&T Evade \$3 Billion," November 11, 1976.

San Jose Mercury, "Top Management Changes at AT&T," January 20, 1977.

Saxton, William A., "CCRA Hearings Just a Rehearsal," Data Comm User, November 1976.

Saxton, William A., "Datran - A Costly Marketing Lesson," Data Comm User, October 1976.

Stimson, Richard A., and Barnett, Marilyn S., "Buying Commercial: Why Not?" Defense Management Journal, October 1976.

Steichen, Terril J., "Competition and the Computer/Communications Convergence," Government Data Systems, July/August 1976.

Telecommunications, "ACCT Position Statement," September 1976.

Telecommunications, "Computer Industry Association Position Statement," November 1976.

Telecommunications, "Conception of a Carrier," September 1976.

Telecommunications, "FCC Actions," November 1976.

Telecommunications, "IDCMA Position Statement, July 1976.

Telecommunications, "Satellite Business Systems," June 1976.

Telecommunications, "The Changing Role of the Common Carrier, September 1976.

Telecommunications, "USITA Position Statement," June 1976.

Tiffany, Curran, "Commentary on Regulation," Bell Telephone Magazine, September/October 1976.

Time, "A Bill for Ma Bell," October 4, 1976.

U.S. News & World Report, "Telephone Monopoly: Good or Bad," November 22, 1976.

U.S. News & World Report, "The Mounting Pressure to Break Up 'Ma Bell'," November 22, 1976.

Waverman, Leonard, "The Regulation of Telecommunications: Pandora's Telephone Box," Challenge, November/December 1976.

White, Donald K., "Phones Get Complicated," San Francisco Chronicle, February 10, 1977.

C. PAPERS/PUBLICATIONS/PAMPHLETS

ACCT, Competition in Telecommunications - An Historical Perspective, paper presented to the Subcommittee on Communications of the Interstate and Foreign Commerce Committee of the U.S. House of Representatives, September 29, 1976.

Arthur D. Little Inc., A Study of Competitive Acquisition of Telecommunications by the Federal Government, prepared for OTP, May 1976.

AT&T, 1974 Annual Report.

AT&T, 1975 Annual Report.

AT&T, National Policy and the Future of Telecommunications, December 1976.

Baumol, William J. and Klevorick, Alvin K., "Input Choices and Rate-of-Return Regulation: An Overview of the Discussion," The Bell Journal of Economics and Management Science, vol. 1, No. 2, Autumn 1970.

Defense Communications Engineering Center, Technical Note No. 35-75, An Analysis of the Feasibility of Increased Dependence on Commercial Communications Satellites for Satisfying DOD Requirements, August 1975.

DOD, 100 Largest Defense Contractors and their Subsidiary Corporations FY 1975, November 21, 1975.

DOD, 100 Largest Defense Contractors and their Subsidiary Corporations FY 1976, November 22, 1976.

DOD, 500 Contractors Listed According to Net Value of Military Prime Contract Awards for Research and Development, Test and Evaluation Work FY 1976, November 26, 1976.

Dun and Bradstreet, Million and Middle Market Directors, 1976.

FCC, In the Matter of Allocation of Frequencies in the Bands Above 890 MC, Docket No. 11866, Memorandum Opinion and Order, September 28, 1960.

FCC, In the Matter of American Telephone & Telegraph Company, Long Lines Department, Revisions of Tariff FCC No. 260 Private Line Services, Series 5000 (TELPAC), Docket No. 18128, Memorandum Opinion and Order, September 23, 1976.

FCC, In the Matter of American Telephone and Telegraph Company and the Associated Bell System Companies, Charges for Interstate Telephone Service, Transmittal Nos. 10989, 11027, 11657 and 12303, Docket No. 19129, September 1, 1976.

FCC, In the Matter of Economic Implications and Interrelationships Arising from Policies and Practices Relating to Customer Interconnection, Jurisdictional Separations and Rate Structures, Docket No. 20003, September 23, 1976.

FCC, Report by the Federal Communications Commission On Domestic Telecommunications Policies, September 27, 1976.

FCC, Statistics of Communications Common Carriers, GPO, Year Ending December 31, 1974.

Federal Legal Information Through Electronics (FLITE), various computer searches of Federal Supplement, Federal 2nd, U.S. Reports.

GTE, 1975 Financial Statistics.

Investors Management Sciences, Inc., COMPUSTAT tape.

Irwin, Manley R., Information Transfer and Public Policy: Competition or Nationalization, statement before Subcommittee on Communications, of Interstate and Foreign Commerce Committee of U.S. House of Representatives, September 29, 1976.

Klevorick, Alvin K., "The Behavior of a Firm Subject to Stochastic Regulatory Review," The Bell Journal of Economics and Management Science, Vol. 4, No. 1, Spring, 1973.

Moody's, Moody's Investor's Service (Utilities), 1976.

President's Task Force on Communications Policy, Final Report, Government Printing Office, Washington, D. C., December 1968.

SEC, Directory of Companies Filing Annual Reports with the SEC, 1976.

Standard & Poor, "Telephone Current Analysis," Standard & Poor's Industry Surveys, December 2, 1976.

Standard & Poor, Standard & Poor's Register of Corporations, Directors and Executives, Vol. 3, 1976.

Stanford Research Institute, Policy Issues Presented by the Interdependence of Computer and Communications Services, prepared for FCC, February 1969.

Systems Applications, Inc., Regulatory Policy Changes and the Future of the Independent Telephone Industry (and Appendices), prepared for USITA, January 1976.

Systems Applications, Inc., The Domestic Telecommunications Industry: Economic Behavior, Competition, and Public Policy (and Appendices), prepared for OTP, 12 June 1974.

Technology & Economics, Inc., Selective Competition in the Telephone Industry, prepared for FCC, 5 November 1976.

U.S. Bureau of the Budget, SIC Manual, U.S. GPO, Washington, D. C., 1967.

- U.S. House of Representatives, Subcommittee on Communications of the Interstate and Foreign Commerce Committee, Agenda for Oversight: Domestic Common Carrier Regulation, April 26, 1976.
- U.S. House of Representatives, Hearing before the Subcommittee on Communications of the Interstate and Foreign Commerce Committee, 94th Congress, First Session on H.R. 7047, November 10, 11, 13 and 18, 1975, Serial No. 94-100.
- U.S. Senate, Hearings before the Subcommittee on Antitrust and Monopoly of the Committee on the Judiciary, 93rd Congress, First Session on S. 1167, Part 2, The Communications Industry, July 30, 31; August 1, 2, 1973.
- U.S. Senate, Hearings before the Committee on Government Operations, Part 1, 93rd Congress, Second Session on S. 704, S. 770, S. 3604, S. 4155, S. 4167, and S.J. Res 256, November 21, 22, 25, 1974.
- USITA, Contrived Competition Means Higher Telephone Rates.
- USITA, Holding Company Report, May 1976.
- USITA, Independent Phone Facts '76.
- USITA, Independent Telephone Statistics, Vol. 1, 1976.

INITIAL DISTRIBUTION LIST

	No. Copies
1. Defense Documentation Center Cameron Station Alexandria, Virginia 22314	2
2. Library, Code 0212 Naval Postgraduate School Monterey, California 93940	2
3. Department Chairman, Code 54 Department of Administrative Sciences Naval Postgraduate School Monterey, California 93940	1
4. Asst Professor C. A. Jones, Code 54Js Department of Administrative Sciences Naval Postgraduate School Monterey, California 93940	5
5. LT John A. Larson, USN, Code 54Lt Department of Administrative Sciences Naval Postgraduate School Monterey, California 93940	1
6. Commander Naval Telecommunications Command 4401 Massachusetts Avenue, N.W. Washington, D. C. 20390	1
7. LT Richard W. Mayo, USN 4340 Farmhouse Lane Fairfax, Virginia 22030	1
8. LT William W. Wittmann, USN 1101 Wimbledon Drive McLean, Virginia 22101	1
9. CDR John T. Vinson, USN, Code 62Vn Department of Electrical Engineering Naval Postgraduate School Monterey, California 93940	1

Thesis

169755

T
M
c.1
M3977 Mayo

The structure, conduct
and performance of the
United States telecom-
munications industry.

10 AUG 83

3 DEC 84

MAR 1 85

NOV 15 85

26736

28895

29

30453

30596

Thesis

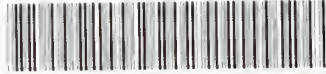
169755

M3977 Mayo
c.1

The structure, conduct
and performance of the
United States telecom-
munications industry.

thesM3977

The structure, conduct and performance o



3 2768 002 12584 1

DUDLEY KNOX LIBRARY